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RICHARD P. ROTHWELL, C. E., M. E. } Editors.
ROSSITER W. RAYMOND, Ph. D. }
T. F. VAN WAGENEN, Staff Correspondent, Denver, Col.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. Articles written by Mr. Raymond will be signed thus * Those written by Mr. Van Wagenen will be signed ‡.

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"THE ENGINEERING AND MINING JOURNAL" ADVOCATES THE ADOPTION OF THE METRIC SYSTEM OF WEIGHTS AND MEASURES,

and urges all who are interested in the simplification of our present complicated and unsatisfactory systems to aid, by their active sympathy and encouragement, the early introduction of this much needed reform.

NEW YORK'S LOSS OF TRADE.

New York is not only losing her export trade by the discrimination that is made against her in railroad freights, but also her import trade, as is indicated by the following table, comparing the shipments of tin plates from Liverpool during the first three months of 1876 and 1877:

Destination.	1877. Boxes.	1876. Boxes.	Destination.	1877. Boxes.	1876. Boxes.
Canada.....	23,529	6,145	Baltimore...	53,999	40,581
New York..	164,285	212,014			
Boston.....	60,915	34,323		360,532	339,691
Philadelphia	57,804	46,628			

It will be observed that the total shipments to the above-mentioned ports have increased, as they have also done to each separate port excepting New York. The metal trade of this city makes grave complaint of the injury that is being done to its business by the discriminations in freight against it.

THE VALUE OF COMPANIES' REPORTS.

Some conscienceless "bear" recently circulated a false report to the effect that the officers of the Delaware and Hudson Canal Company had taken steps to put that company in the hands of a receiver, and "the street" put enough faith in the fib to cause a sudden decline in the company's stock. Of course, if the solvency of the company had been beyond suspicion, no one would have credited the stupid bear, and his false report would have been laughed at. As it was believed to some extent, and actually did injure the company, the directors are naturally greatly incensed, and have offered a reward of $5,000 for information that will lead to the conviction of the sinner. We hope they may catch him, and punish him as he deserves when they have him; but, in the mean time, we beg to make a suggestion which may prevent for the future the injury of the company's credit by the circulation of stupid rumors of this kind, and save the expenditure of the stockholders' money in trying to unearth the wretches who circulate such idle stories. The remedy is exceedingly simple, and there is no patent on it; it is simply that the directors do their duty by the stockholders and make a full and truthful report of the actual condition of the company; of what its coal costs to mine and to market; of the basis of the valuation of its assets, what property it has, the cost and actual value of the same, the leases and guarantees of bonds and other forms of indebtedness it has made; in a word, such a report as will enable each stockholder to see for himself the value of his investment and the wisdom with which his property is being managed.

This simple remedy should cost nothing, for it is but a part of the duties of the officers who now draw large salaries for this very thing. When the stockholders *know* the actual condition of their property, if it be as satisfactory as the officers would have them believe, no such silly device as circulating a rumor of the impending bankruptcy of the company will be able to injure them. In other words, it is the directors who injure the credit of the company by neglecting to furnish stockholders the information they are entitled to, and that would prevent the attacks of bears and wreckers.

Those who, by circulating false reports, depress the stock, and thereby injure the innocent stockholders, should certainly be punished, but the injury they inflict is small, compared with that produced by such deceptive reports as those issued, almost up to the day when it went into the hands of a receiver, by the New Jersey Central Railroad Co., and others that might be named.

It is the deceptive and even untrue reports of directors that swallow up widows' and orphans' slender resources. Is there no law by which deceiving "bulls," as well as wrecking "bears," can be punished? And especially should there be an ample remedy for deceived stockholders against their agents, the directors, who misrepresent the condition of their business, till it is too late to save their property by dismissing the unjust stewards.

FACTS ABOUT THE BLACK HILLS.

Except perhaps San Juan, no part of the country is receiving more vigorous attention from newspaper correspondents than the Black Hills. There is a vast amount of nonsense and exaggeration in the Eastern journals on the subject, and many erroneous impressions are conveyed by the publication of letters which on their face bear evidences of the ignorance of their writers concerning the subject in hand. A gold or silver mine is still something so new and vague to the minds of the general public, that nothing is easier than self-deception as to the true or prospective value of such properties, and excitements, which rarely fail to result disastrously, at least for a time, are easily inaugurated and still more easily stimulated.

Probably the Black Hills and the Big Horn country, including the yet unexplored country below the Missouri in Southern Montana, is the last gold field that will be opened in the West. For many years past it has been thought that these localities were rich in the precious metals, but the Sioux have held their own so well heretofore that very few parties have been able to explore or prospect within the limits of their reservation. These districts are, however, now at last open to the miner, and the work done there during last year has given such evidences of their wealth that the rush this season will necessarily be large, and perhaps unprecedented. In view of this, some well-supported facts concerning the new fields will not be without value.

The districts yet known to be rich in gold are not more than a dozen in number, and, even should they pay as well this year as last (which is not to be expected) cannot possibly sustain a population of over 3,000 souls. The yield of precious metal last year, according to the most liberal estimates, did not exceed $1,000,000, and in all probability fell much below that figure. In a new country where money cannot be duplicated by banking facilities, where there are no opportunities for the support of middle-men in manufacturing or ore reduction, and where agriculture has gained no foothold, so that everything needed must be imported, a very much larger production of raw material is required to sustain life than otherwise. Expectant emigrants to the Black Hills should look this point squarely in the face and weigh it well. If they go, there are absolutely no chances to obtain work, and they must look to their own resources entirely for support. The cost of living is about double what it is in the States, and fifty per cent. greater than in the majority of old mining camps. Every new man who comes to the Hills without a purpose, and the means to carry that purpose into effect, will be a dead weight on the country and a stumbling-block in his own way.

A look at the prospect in the Black Hills and adjacent country will be, however, more cheering. Its resources (so far as the miner is concerned) may be summed up under three heads:

1. The gold placers.
2. The gold quartz veins.
3. The silver quartz veins.

THE GOLD PLACERS.

Up to date about 30 gulches—counting tributaries—have been found to be auriferous to an extent that will pay fair wages, $4 to $6 per day. In spots these gulches have proven rich, and fortunes have already been taken out, but this should not mislead any one who goes to the country for *business*. So far almost all the ground opened has been found to be shallow—from 2 to 15 feet deep—and it may be expected that the bars will be rapidly exhausted. In many ways the auriferous gravel deposits of the Black Hills resemble those of Montana, excepting that as yet no ancient channels have been found, such as are now being explored at Helena, Diamond, and Virginia City, though we have little doubt that in time they will be. Every inch of ground, however, that shows any indications of gold has been staked off, and the new-comer must be prepared to go out and find his own claim. Here the prospects are of the best. For hundreds of miles along the southern slope of the Upper Missouri valley every indication points to the existence of numerous paying bar and gulch deposits. The gold field extends east and west for a distance of 400 miles, and is a field for the prospector and explorer that will not be exhausted for years. The work of opening it, on the other hand, is fraught with danger, privation, and hardship, but we do not know that there is any use in informing the prospector of this, for he knows it better than any one else, and would not be deterred if the obstacles were double what they are in number and magnitude. But this is the work of trained pioneers, and "tender feet" should not travel to the Hills to indulge in such a game without due consideration of what is to be expected.

Towards the end of last year attention began to be drawn to the quartz veins which are very numerous in the Hills; and explorations upon a number of them disclosed the fact that many presented most favorable opportunities for system-

atic development. There is nothing peculiar in the gold lodes of this district. The metal is found, as elsewhere, in quartz, which must be crushed in stamps to yield its gold. Most of the veins show no decomposition, to amount to anything, at the surface, and in some that enemy of the miner—iron pyrites—appears at the grass roots. There are already three quartz mills on the Hills, we believe, or on their way there, and a man with means to open a mine will not find himself at loss for work.

In the matter of

SILVER VEINS

but little is known. Some exceedingly rich galena, gray copper, and ruby silver ore has come from the Hills in the shape of assay samples, and also some specimens of no value. But there is no doubt of the existence of rich silver veins, and though the history of every mining district in the West shows that this class of deposits is almost the last on the list to be opened and rendered payable, yet their time will come, and when it does it will doubtless be shown that the Black Hills possess as rich veins of this metal as any to be found anywhere.

Our readers must not allow themselves to think, from what we have said, that the JOURNAL is in any way inimical to this new El Dorado, or desirous of slighting its claims. On the contrary, believing and knowing it to possess high mineral resources, our desire is to warn off all who go there with no purpose but to chase their luck, and who will injure the country and retard its development. After twenty-five years of experience in precious metal mining, the American people ought to know enough about the industry not to be led away by the false hopes of the gold hunters. There is plenty of room on the Hills for men of energy, determination, and good health, if they have enough means to overcome the obstacles sure to be met with at the outset; but there is no place there for poor men yet. It is not a poor man's paradise in any sense, for its placer mines, according to the best information attainable, are not its main resource.

THE COLORADO MINING STOCK EXCHANGE.

This institution, which was opened at Denver, in January, 1875, with considerable *eclat* and a very fair prospect of success, practically closed its career last winter when reorganized under the lead of Mr. MOSES ANKER, and is now, beyond a doubt, as dead as the deadest of corpses. Its reorganization in the winter of 1876 was rendered a necessity by reason of the fact that a large number of members, among whom were numbered nearly all that were regarded by mining men in Colorado as worthy of confidence, resigned or allowed their names to be dropped from the list for non-payment of dues. The remainder, gathering around the wreck of the institution, made a ridiculous attempt to maintain the semblance of a mining exchange, but finally were forced to abandon even that. We learn now, as said above, that the Colorado Stock Board is a thing of the past in the fullest sense of the phrase. Its fine mineral cabinet and handsome president's desk still may be found at the long room on Lawrence street, but a fashionable tailor has rented the front half of the apartment, and if the President ever takes it into his head to rap the meeting to order and call the list of stocks, his voice is liable to be interrupted by the hiss of the "goose" as it passes over heavy broadcloth, or the maledictions of the head tailor over the failure of indigent brokers to pay for their last new spring suit of clothes.

When the Stock Board became moribund last year, Mr. MOSES ANKER, a gentleman of speculative tendencies, seized the wind-tossed and scuttled bark from the jaws of death, as it were, by advancing himself to the presidency of the institution, and became practically the controlling spirit in its councils. As the new "anker" took hold, all the small "ankers" of the concern clustered around him, and sank their arms deep in the mud and silt on the bottom of the new harbor. Simultaneously nearly all of the original crew of the ship took to the life-boats, resigned the vessel to its new commander, and effected a landing, without any loss beyond that represented by initiation fee, etc., which they were no doubt exceedingly glad to sacrifice for the privilege of getting well rid of the rotten ship. We now come to the point of the whole business. The Stock Exchange, from the position of an opulent institution, owning a fine cabinet of minerals, a patent ice-cooler, and an abnormally obsequious janitor, gradually sank (or rose, as the reader may prefer) to the position of a close corporation owned and managed by Mr. MOSES ANKER. Shortly a well-worded advertisement appeared in one or more New York papers—and possibly in all the papers in the large Eastern cities—which advertisement invited the investing public to guard against all mining schemes put upon the Eastern market which had not the sanction or commendation of the Colorado Stock Exchange. The notice also conveyed to the public the idea that the said Stock Board was the legitimate representative of all mining organizations in Colorado, that any one purchasing from parties outside its circle would infallibly be swindled, that the said Board was the repository of all correct information about mines in the State—in fact, a sort of Investors' Bible, which could not lie. We believe the President of the Board appended his name to the document.

Of course such an advertisement would be likely to excite considerable comment both at home and abroad, and this it did in fact. People began to wonder whether an institution which had fallen into so much odium at home could by any known method of whitewashing appear before the outside world in clean clothes; whether speculators, led by the man who sold the Caribou for ten times its proper value to the confiding Hollanders, could claim to be the only righteous men left in this Western Sodom; whether a stock board that had ignominiously retired into the back end of a tailor's shop could by any means claim to be the representative of reputable mine-owners and the repository of the hopes of the State.

The fact is, that respectable people—as well among those not actually engaged in mining as those who are—are utterly sick of this mining agency business, and thoroughly exasperated at the continual efforts of the glib-tongued middlemen, so common on the outskirts of every mining community, to thrust themselves in between the miner and the investor. In nine cases out of ten their touch is contagion. Like the fraternity of wreckers, who live by the failure of others, their object is solely to make a profit to themselves at the expense of both the purchaser and seller without any regard for the interests of either. As a rule they are a tax on the community, whose influence for evil must either be bought off or fought off before any transaction of which they have heard can be carried through.

It is a matter of regret that would-be buyers of mining property do not see the advisability of steering clear of these institutions. No man should invest in mines without seeing the mine himself, or, if that be impossible, without securing an examination by some competent and reliable engineer. It is also an equally foolish course for sellers to place their property in the hands of these agencies, for, once in their power, they have the capacity of holding on till the client has given away his last cent.

The Denver Stock Board was inaugurated, we believe, in good faith, by most of its members, but there were some on the list—old acquaintances of Colorado mining men—whose names were not satisfactory. Since its reorganization, nothing has been done to warrant the public in having the slightest confidence in its capacity or its desire to promote the industry of the State. ‡

NEW PUBLICATIONS.

THE ELEMENTS OF ANALYTICAL MECHANICS. By DE VOLSON WOOD, A.M., C.E. New York: JOHN WILEY & SONS. 1876.

The science of mechanics has a twofold importance. Its practical importance consists in this: that the principles and processes of all mathematical physics are derived from it. It is of the greatest utility in the explanation of the phenomena of the world external to us, and it is indispensable in a thousand applications of science to the needs of life. But its importance in a theoretical point of view is perhaps still more striking. The development of every physical science has been characterized by certain inevitable and successive processes. First of all comes the collection of facts; then the formation of a theory to explain them; then the establishment and verification of this theory by the successful prediction of the future; and, finally, the reduction of the science to its simplest principles and most general form. Through all these processes the science of mechanics has passed, and it has finally attained to a perfection and completeness to which no other physical science can make pretension. It is, therefore, not only the foundation-science to the principle of which every special branch of physics conforms; it is the *type*-science: and the degree of completeness of any physical science is to be determined by the conformity which it exhibits with the principles of mechanics, and the advance which it has made in the process of development which the type-science seems to have well-nigh completed.

Corresponding to this twofold aspect of the science, we have two methods of considering it in its relations to scientific education. First, it may be taught merely with reference to its practical uses. It is not to be denied that in certain applications of the science, as in engineering, this method is quite sufficient, and it is not necessary, for these practical purposes, to consider the theory of mechanics in all its generality. Secondly, it may be studied in its most general form; as it is developed, for instance, in the writings of the great master LAGRANGE, to whom, perhaps, more than to any other it owes its perfection. This method, however, while it is of incalculable value and importance to any student who wishes to acquire broad scientific views, is lacking in a practical point of view, and in its original form is probably too abstract for most beginners. Fortunately a third way is open in the judicious union of the two methods. This, then, is the problem which presents itself to the writer on analytical mechanics for the purposes of instruction. While he is to take care that the practical character of the science shall be clearly brought out, so that the student shall not find himself provided with tools which he is unable to use, he is also to see to it that the scientific spirit, the perfection and generality of the great type-science are kept distinctly in view. There are indications that Professor WOOD has proposed this problem to himself in the book which we review. We cannot, however, compliment him upon his success in its solution.

The most essential requisites of any treatise on mechanics, whether it is practical or theoretical in character, are clearness and accuracy. We will, therefore, proceed first to examine the book with reference to these points. On the very first page we find the following remarkable definition, "Matter is that which receives and transmits force." In point of fact, we have no reason to believe that force is transmitted by matter. Taking the force of gravitation as an example, we have strong reason for believing that it is not transmitted in time or dissipated in space. In a word, Professor WOOD defines matter by a property which it is not known to possess. The absurdity of the definition can be made still more apparent by substituting for the word *force* its definition given on the second page. We then find that *matter is that which receives and transmits that which tends to change its state with regard to rest or motion!*

Perhaps it will be well, at the outset, to indicate what is the matter with Professor WOOD. A recent article on the subject of Force, which he has contributed

to *Van Nostrand's Magazine*, reveals the trouble. We do not propose to examine this article in detail. Its errors are too apparent to escape the notice of any one who has a sound elementary knowledge of the subject. We refer to it only on account of the light which it throws on Professor WOOD's errors. "I do not think it advisable," says one author, "to consider anything as force or as the measure of force which cannot itself be measured by this unit [the pound]. Momentum MV is measured in *foot-pounds* [!], and hence *generally* is not a measure of force!" In this quotation we have the whole difficulty. Professor WOOD, here and throughout his book, has utterly failed to appreciate the distinction between forces and the effects which they produce.

Within recent years a school of philosophers has sprung up, taking its origin in Germany and France, which has assumed to change the nomenclature of the science of mechanics, and to call that force which, in accordance with the system of NEWTON, should be energy. We do not propose to discuss the advisability of this change. One effect of it is very apparent: it has confounded many popular scientists, and it seems to have hopelessly confused Professor WOOD, for he gives us a definition of force according to one system, and a definition of matter according to another. But this is not all. In order that the student may not have "a vague and confused idea" as to the real meaning of the word force, he is to consider but one kind of force, "that which is equivalent to a pressure." Now, according to the generally accepted meaning of the word pressure (and we cannot suppose any other signification is intended, since no definition is given), it denotes the statical effect of a force, not the force itself. Nor can it be considered, in any true sense, to be equivalent to the corresponding dynamical effect, which is motion, since these magnitudes are referred to entirely different units. According to Professor WOOD, however, the magnitude of a force is known only when it is given in pounds; yet he does not altogether reject the dynamical measure of force, although he fails to point out what the unit of measure is. Many other passages in the book seem to show that Professor WOOD imagines pressure and motion to be equivalent. For instance, on page 67, "We have seen that a pressure, when acting upon a free body, will produce a certain amount of motion, and that this motion is a measure of the pressure"! But motion cannot be the statical effect of force. What, then, can Professor WOOD mean by pressure? Is this notion introduced to prevent the student from getting confused ideas?

Professor WOOD's inaccuracies are not confined to the subject of force. For instance, we are told that "density is the mass of a unit of volume"!—an example of the author's prevailing carelessness in confounding the thing with its measure. Again, on page 45, we have the remark, "Every moving body on the surface of the earth does work," etc. Here we have moving matter confounded with working force. Again, on page 58, "One of the grandest generalizations of physical science is, *that no force in nature is lost.*" Here we have force again confounded with energy. Again, on page 89, "A statical couple cannot be equilibrated by a single force. It does not produce translation, but simply rotation." Of course a statical couple does not produce motion of any kind. Again, on page 180, we have central forces defined as "such as act directly towards or from a point called a center." The distinguishing characteristic of a central force—that its intensity is a function of the distance—is ignored. According to the above definition, all forces are central. Again, on pages 203 and 220, we have specific reference made to the principle of D'ALEMBERT, yet this principle, historically one of the most important in the science, is not elsewhere mentioned, and is nowhere stated or explained. Again, on page 59, we find the following: "The terms '*Impulsive force*' and '*Instantaneous force*' are frequently used to denote the effect of an "Impact"; but since the effect is not a force they are ambiguous," etc. We doubt if any writer of reputation ever used the above terms in the sense indicated; but what are we to think when Professor WOOD follows the above remark with this statement?—"An *incessant force* may be considered as the *action* of an infinite number of infinitesimal impulses in a finite time"!

We could cite many more evidences of Professor WOOD's inaccuracy and want of clearness, but we shall confine ourselves to a very few. In his treatment of the important subject of the moment of inertia we find no attempt at an explanation of the functions of such a quantity. The only relation between the moment of a force and the moment of inertia of a body with reference to an axis is that they are both measures of capacity, although of different kinds. The one measures the capacity of a force to produce rotation about the axis; the other, the capacity of the body to store up work during such a motion. In place of a clear statement of the use of such quantities in the science, Professor WOOD gives a fanciful relation which he thinks he has detected between them. The moment of inertia, he says, may be considered as the *moment of a moment*, whatever that may mean. We need scarcely say that such a notion is useless and confusing, and does not exist in any physical sense.

Again, we find an elaborate description of KATER's method of determining the length of the simple second's pendulum, in which most of the space is devoted to a description of a method of determining the time of oscillation. This description might well have been omitted from an elementary text-book, and the space devoted to a clear explanation of the theory of the apparatus employed. No such explanation is given. The construction and use of KATER's pendulum depends upon two principles. First, the axes of oscillation and suspension are convertible. Second, the time of the oscillation is a minimum when the axis of suspension passes through the principal center of gyration. This second principle is of equal importance with the first; but Professor WOOD ignores it altogether, and thus misses the point of the method.

Referring to the preface of the book, we find the following remarkable paragraph: "This work, though analytical, is, in a certain sense, the reverse of LEGENDRE's celebrated *Mecanique Analytique*. LEGENDRE, at the outset, deduced a general equation from which all others were derived," etc. This is again explicitly stated on page 161, where the equation is actually given with the annexed comment:

$$\text{"R}\,\delta r - \Sigma m \frac{d^2 s}{dt^2}\delta s = 0 \qquad (118)$$

This is the most general principle of mechanics, and M. LEGENDRE made it the fundamental principle of his celebrated work on *Mecanique Analytique, which consisted chiefly of a discussion of equation* (118)"!

Few of our readers will need to be informed that the *Micanique Analytique* was not written by LEGENDRE, but by LAGRANGE. Nor was any such equation discussed in the *Mecanique Analytique*, nor did the author of that masterpiece of analysis propose or attempt to base the science on any single formula. Almost the first words in the book are, "I propose to reduce the theory of that science [mechanics], and the art of resolving the problems which belong to it, to *general formulas.*" Professor BARTLETT of West Point, about the year 1850, was the first to show that the "general formulas" of LAGRANGE could be deduced from the single equation which Professor WOOD has coolly accredited to the author of the *Mecanique Analytique*, or rather to M. LEGENDRE, ignoring not only LAGRANGE's work, but that also which has been done by Professor BARTLETT to develop the science in this country.

But let us return to the preface, and ascertain in what certain sense Professor WOOD's book is the reverse of "M. LEGENDRE's celebrated work on *Mecanique Analytique.*" "This work" (his own), continues Professor WOOD, "at first establishes the equation for motion due to a single force, and by adding principle after principle the most general equations become established. The latter method is the one by which every science is at first developed, and presents great advantages over the former in the course of instruction; but the former, as a method of pure analysis, cannot be excelled." With respect to all this, we have to say: First, the method by which the science of mechanics has been developed is not the best method to be pursued in a course of instruction, because the principal importance of its study is as an exercise of the intellect, since it is a perfect illustration of the nature of scientific reasoning; and in this respect its *logical* development is of the utmost importance. Secondly, the science has not been developed in the way indicated by Professor WOOD, as a very cursory examination of its history will show.

It is not necessary to extend these instances of gross carelessness and inaccuracy further; indeed we should not have devoted this space and prominence to a review of the work were it not that Professor WOOD has the reputation, and deservedly has it, of being a very able mathematician; he should appreciate the fact that a widely known name and a high reputation impose corresponding obligations. The errors and lack of precision which abound in this work might be passed over as excusable in the work of an unknown beginner, but they become quite unpardonable when they are the result of gross carelessness, we might almost say slovenliness, in a master like Professor WOOD, who undoubtedly knows better. We understand this work has been adopted as the text-book in a number of our colleges and schools, still another reason for impressing upon its author the necessity of revising it thoroughly and correcting it before a second edition is allowed to appear.

The prevailing inaccuracy of our scientific education is, we believe, largely due to the fact that the country is flooded with text-books in which the prevailing characteristics are careless and reckless statements. We want no more of them, and certainly expect none from so high an authority and experienced a mathematician as Professor WOOD. R.

The INTERNATIONAL REVIEW for May contains an article on the Philadelphia Exhibition, by Gen. Francis A. Walker, which presents the only complete, official, and historical account yet published of the organization and administration of the great International Exposition of 1876. General Walker was Chief of the Bureau of Awards, and contributed very largely to the success of the Exhibition as a whole. In this article General Walker discusses the following interesting particulars: I.—The arrival of the exhibits, their bulk and weight, and the successful means of transportation and delivery. The defects in the customs service, and the responsibility therefor. II.—The Acts of Congress constituting the authorities of the Exhibition. III.—The difficulties in harmonizing the Centennial Commission and the Board of Finance, and the surprising efficiency of the management after a compromise had been effected. IV.—The plans and construction of the Exhibition buildings, and the proportion of the general expenses borne by different States and individuals. V.—The police administration on the grounds, the method and price of admission, and the average attendance during the months of exhibition, together with the passenger transportation on railroads. VI.—The foreign aspects of the Exhibition and the attitude of foreign countries with respect to it. VII.—The explanation of the system of awards, the views of the judges thereon, how it came to be adopted, and what were its results.

APPLETONS' JOURNAL for May has a most interesting article on "The Austrian Arctic Expedition," and Julian Hawthorne's charmingly-written article, "The Great White Wall" (the chalk cliffs of England).

HARPER'S MAGAZINE for May has a very good description of African exploration in "Cameron's Journey across Africa."

IRON RIVER SILVER DISTRICT, SOUTH SHORE OF LAKE SUPERIOR.

By Col. Charles Whittlesey.

In the summer of 1876, I spent several weeks in the vicinity of Iron River and Porcupine Mountains, tracing out the stratum of black slate, at the bottom of which there is a silver-producing belt. As early as 1769-70, Alexander Henry and his associates, of London, explored this region for silver, which it was even then reputed to contain. There was in 1846 an adit plainly visible in the bluff north of Carp River, which had the aspect of work sixty or seventy years old, and which was probably done by his party, who are known to have wintered on the Ontonagon. Mr. Bela Hubbard, as assistant to Dr. Houghton's survey in 1846, and Mr. Whitney the partner of Dr. Foster, reported the existence of a quartzose band, which crosses Iron River at the stamp mill, but they said nothing of silver.

The Indians have been persistent in their reports of its existence in the region of Iron River, and the west fork of the Ontonagon, from the days of Henry to the present time. They have frequently shown specimens containing silver. But Mr. Austin Corser, of Ontonagon, was the first person who discovered it in place in the year 1856. Keeping the locality secret, he secured a pre-emption of the land in 1870. This is situated on Little Iron River in the southwest quarter of Sec. 14, T. 51, north range, 42 west, about a mile from the shore of the lake.

In 1872, the Iron River region witnessed the usual excitement which discoveries of precious metals bring about, which reached its greatest intensity in 1874. When I revisited the country in 1876, after an absence of twelve years, the Cleveland mine was the only one in operation.

Geologically considered, it would be difficult to find a more interesting region. I know of no country where silver is found in such geological relations. The *black slate*, at the base of which it is found, is a member of the Potsdam red sandstone of Lake Superior, which rests upon, and is intercalated with, the trap beds of Point Keweenaw, Portage Lake, and the Porcupine Mountains.

It has been traced from a point several miles east of the Ontonagon River, where it tapers out; westerly to Mineral River, in T. 50, R. 42, dipping northerly, like the trap beds, towards the lake. Not far west of Mineral River, the country becomes low along the strike of the bed, in the valley of Iron River, and the rocks are generally covered by red drift clay, but where seen they are the Potsdam red sandstone. Traveling west across the valley of the Iron River into T. 50, R. 43, the slate is well developed at the Nonesuch Mine, showing at least 250 feet of thickness, but the dip is reversed. Six miles farther west, on Sec. 12, T. 50, R. 44, on the southern flank of the Porcupines, the same beds are reported by Mr. Cummings, dipping south 30° east about 30°, the strike being north 60° east.

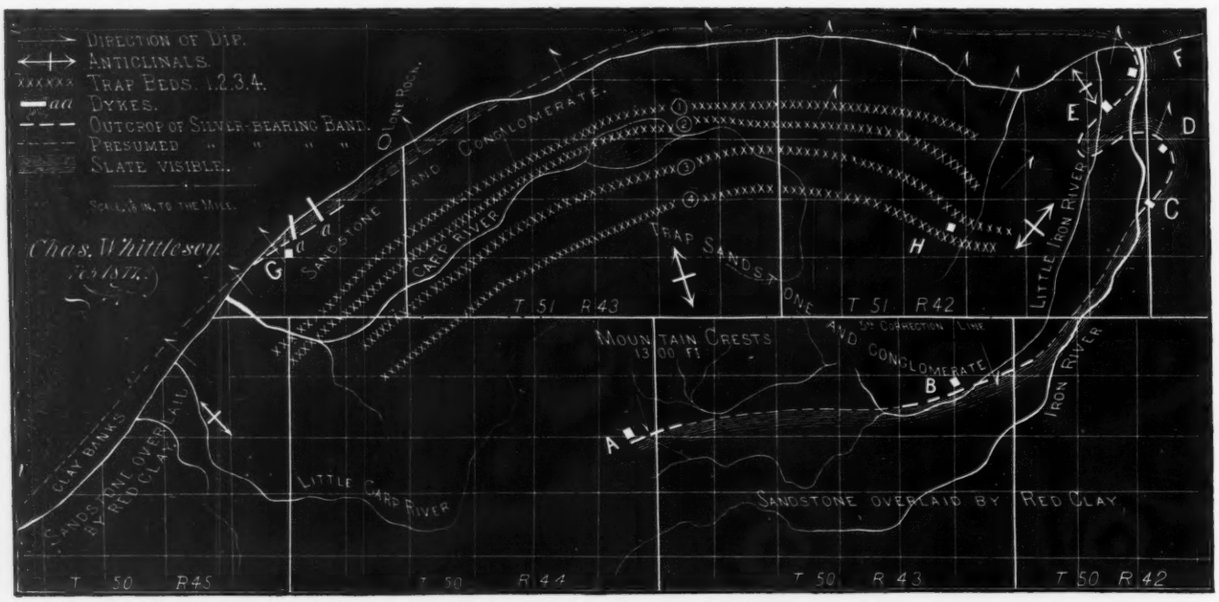
the black slate interstratified somewhat below the middle, was first raised up by the main trap range. After this, the rise of the Porcupine Mountains gave it another tilt, heaving the sandstone to the east on the Ontonagon and to the west on the Little Carp almost undisturbed. Around both ends of the Porcupines there are low branching uplifts or corrugations of the sandstone conglomerate and slate, all modified by the subsequent drift forces. On the south and the east, the north and the west, all the strata fold around the central mass above alluded to conformably, passing everywhere beneath the sandstone, which overspreads the low flat country covered by red clay.

It is possible that the outcrop of slate on the heads of Mineral Creek, between Iron River and the Ontonagon, may continue to the westward through the Porcupines north of Akogobe Lake, and join the outcrop at Presque Isle River, the mouth of which is near the southwest corner of the plain. In that case the synclinal of Iron River Valley should also extend through the mountains, across the Little Carp, and enter the lake between Presque Isle and Carp rivers.

In this space of about 6 miles the rocks along the shore are covered by red clay drift. This surmise is somewhat confirmed by the fact that the slate from Presque Isle across Black, Montreal and Opinike rivers is nearer to the trap than it is around the Porcupine Mountains, and the beds between are principally conglomerate, the same as at Mineral Creek. Opposed to this theory is the fact that the strike of the slate at the great spar vein near the Lone Rock is directly towards the mouth of Presque Isle, and the dip at the two places is in the same direction. If it does not continue westward through the lake to this point, it must curve to the south beneath the red clay, and doubling back around the mountains, over the ends of the trap beds, as it does at Iron River, connect with itself at the Cummings location, A.

By arrows and double-barbed arrows, I have indicated the dip of the beds and the anticlinals, as well as the small scale of the plan will permit, the geographical path of which is from Foster and Whitney's map of 1850. I now pass to details and the singular features of the silver-bearing band at the base of the slate. Openings have been made or exposures observed at ten points along a line of about 13 miles in length, including all the doublings and contortions of the belt. Native silver has been obsefved in nine of these exposures, which indicates regularity in the mineral deposit. Some explorers think they have detected the black sulphide of silver, but this has not been settled by analysis. An analysis of the black slate itself taken from the Montreal River, made at my request by Prof. Cassells in 1860, showed a notable proportion of carbon. This may be in the form of graphite, which at Silver Islet on the north shore appears to be favorable to mineral segregation.

TO BE CONTINUED.



The wood-cut I here introduce shows what I consider to be its course from this point, easterly around the Porcupine Mountains, northwesterly into the lake. It is continued from there to the west, passing south of the Lone Rock, cutting off a slice of the sandstone formation, dipping all the way to the north and northwest. About eight miles farther along the shore, it appears to strike the land at Presque Isle River, more tilted towards the north, crossing Black River at the mouth, the Montreal three miles from its mouth, where it is 750 feet thick and stands nearly on edge; thence southwesterly to the Falls of the Opinike with a diminished thickness. Beyond this it is covered by the drift and probably thins out in the neighborhood of the Bad River. A north and south profile through the center of T. 50, R. 41, shows a heavy bed of conglomerate beneath the slate, between it and the uppermost trap bed, all dipping northerly. On the north to the lake, a distance of seven miles overlying the slate, is the usual red sandstone in great thickness, becoming more and more horizontal. It would require an entire season in the field to trace out all the intricacies of this slate and trap formations. The Porcupines appear to be an uplift subsequent to that of the main range. An explorer would first endeavor to trace the Mineral Creek slate westerly, and find whether it skirts the basin of Iron River on the south, and whether it bends around this valley in a loop-like curve to the Cummings location, where its dip is southerly. Here it lies about 2,000 feet above the trap beds, which also dip to the south according to a profile of Captain D. Beaser made in 1874.

On the height of land in Sec. 35, T. 51, R. 43, about three miles north of A, he finds an anticlinal where the brick red phorphyritic trap rises as a central. North of this, from where I have indicated a change of dip, the beds of trap, conglomerate and sandstone, which are of great thickness, plunge southerly at an angle of 25° to 30°.

It would seem that the great sandstone 5,000 to 6,000 feet in thickness, with

PRIMARY LESSONS IN METALLURGY.—I.*

Written for the Engineering and Mining Journal.

When the oxides of most metals are exposed to the action of reducing gases, the same being heated to the kindling point, the oxygen of the ore and carbon or hydrogen of the reducing gases burn together, and leave the metals behind as ashes.

This short and innocent-looking proposition is the basis of industrial metallurgy, yet we should be wrong in supposing that the conditions of the formula are easily established, or that the fight against interfering conditions is easily won.

To understand the deoxidation of ores, it is necessary to know the ways in which fuel burns with O, and especially to understand the combustion of carbon, which is the universal fuel for metallurgic furnaces; hence it will do us no harm if we carefully review our knowledge upon that subject, and restate the chief-known facts, thus:

A primary condition of the burning of two bodies together is, that at least one of them be in the gaseous form, otherwise the atoms or molecules of one body could not approach and commingle with those of the other so completely that the affinities may reach across the spaces between atoms and set up the combination which we call combustion, or burning.

Carbon burns in air in two ways. One equivalent of C combines with one equivalent of O and produces carbon monoxide gas, usually written CO. Under other conditions, such as a greater supply of air, one equivalent of C combines with two equivalents of O and produces carbon dioxide, usually written CO_2. If CO gas is mixed with about its own volume of air and kindled, the mixture will explode—that is, will burn all at once—and if the same gas and air are commingled by the confluence of a stream of each, and a kindling flame be applied at the place of confluence, they will burn together in a steady flame to CO_2, and produce about twice as much heat as was produced by the original burning

of the C with the first equivalent of O, producing CO. This fact of the heat of the second burning being twice that of the first appears strange, until we consider that the solid C could not even be triturated to powder without the expending of work, and then to drive the very atoms apart from each other so as to make the matter gaseous requires much more work; then we conclude that the first burning to CO really makes as much heat as the second burning to CO_2, but that about half the heat of the CO combustion is absorbed by the work of gasifying the C.

Whether the fuel burns at once to CO_2 in an ordinary clear fire, or burns first to CO and immediately afterwards to CO_2, is a moot point; but we know that, if the layer of fuel be pretty thick and close, and the draft of air through the fuel be slow, the final result is CO gas, which will burn again to CO_2 upon being mixed with air, provided the heat at starting is so high as to kindle the flame. We also know that in such case the lower part of the fire is very hot, indicating a CO_2 combustion where the air first enters among the fuel, while the upper parts are not much above a very dull-red heat, unless air enters above the fire and burns the CO gas to CO_2 at the surface, when of course the heat just above the fuel is that due to CO_2 combustion, and we have a deep fire, hot at top and bottom, and cool, or rather less hot, in the middle.

These phenomena indicate another mode of combustion of C and O, viz., the backward burning—so to speak—of CO_2 to CO, accompanied with the absorption of heat by gasification of C. This backward burning has been established by experiment. A stream of very hot CO_2 gas was passed through a bed of fuel for some time, with the result of setting fire to and consuming the fuel, and the production of CO gas, which was much cooler than the original CO_2 gas, showing that heat had been expended in gasifying the new equivalent of C which had been taken up.

It is necessary to have these facts—and whatever else we may know about combustion—clearly in our minds, to comprehend even crudely what goes on in the blast furnace, the blowing fire, the puddling furnace, and during any operation for the recovery of metals from ores; for these three methods of combustion occur in nearly all furnace work, either at the same time or one after the other in regular sequence.

All the ordinary combustions are modified and made slower than they would otherwise be by the presence of nitrogen (N) in the air, which neither burns with fuel nor has any other positive effect upon combustion or the reduction of metals; it merely interposes its atoms between those seeking to combine, and absorbs and carries off heat.

Hydrogen (H) exists in most kinds of fuel, either combined with O as water, or nearly or completely free. The presence of free H is a positive benefit, because it not only burns with O and generates heat, but it has the quality of assisting in the gasification of C and carrying it to the place of final combustion. The mode of doing it is not well known, as it has not been ascertained that any preliminary combustion of H and O occurs, as is the case with C and O, yet the fact that H is a carbon carrier remains undisputed, although it may be that the C and H were originally combined in the fuel as hydrocarbons. So much of C as is gasified with H escapes the contamination with N, which it would receive were it carried upon O derived from air, and the resulting gas gives a more intense heat, both by reason of the combustion of H and the diminished dilution with N.

When H and O are present in fuel in the form of water, or in the proportions to form water, there is a direct loss, unless the fire is hot enough to decompose the water with its constituent gases, because the water is simply vaporized, and goes off as steam, carrying a large quantity of heat of low intensity to no useful end. But if all the water be decomposed, and the gases traverse heated fuel, the H derived from the water gasifies carbon, and the O derived from the same source burns with C to CO without contamination with N, so that the resultant mixture of gases is richer in combustible, while the burning of C and H return nearly as much heat as was originally absorbed in their gasification, and only the latent heat of the resulting steam is lost. These are the reasons for the practice of using as much water or steam in the ash-pits of the gas producers connected with Siemens and other gas-burning furnaces, as the heat of the CO_2 combustion at the grates will decompose or dissociate.

Having furbished up our knowledge of combustion in some important particulars, we will now consider the phenomena of the bloomary fire—a modification of the Catalan forge—where iron ore is treated, as a step towards a comprehension of what occurs in the blast furnace, and in other metallurgic apparatus.

N. W. W.

THE NOMENCLATURE OF IRON.*

By Henry M. Howe, A. M., M.E.

In discussing the classification of iron to-day, we are to leave out of consideration the general division into non-malleable or cast iron and malleable iron, as to the adequacy of which no question has been raised; and to confine ourselves to the subdivisions of malleable iron. This has been classified, according to the extent to which the properties imparted by carbon are present, (viz. resilience, hardness, strength, and, above all, the capacity for being hardened by sudden cooling from a high temperature), into (1) wrought iron which cannot be hardened, and (2) steel which can be hardened; and this classification I shall, for briefness, term the carbon classification. Until within a few years all authorities, both metallurgical and general, have concurred in explicitly recognizing the carbon given qualities, and pre-eminently the capacity for being hardened, as the essential qualities of steel; this is laid down with clearness by every writer on the subject.

For several years, this old classification has not been sufficient to meet all our needs, since the genius of Bessemer, Siemens, and, I may add, Holley, has produced wrought iron which has been perfectly melted, and thus freed from certain mechanical adhering impurities. This causes what we call homogeneousness for want of a better word, and gives rise to many important qualities which the old wrought iron had not; qualities universally recognized, though not readily described. I shall, for briefness, style them the fusion qualities, and a classification based on them, a fusion classification.

These qualities render the new product so vastly superior, for most purposes, to the wrought iron formerly known, that it is necessary to arrange the nomenclature of iron so as to indicate their presence or absence in any lot of wrought iron under consideration.

Now, this new wrought iron possesses no one of the qualities which were acknowledged essential to steel, as contrasted with wrought iron, viz.: the power of hardening to a considerable extent, greater strength, hardness, resilience, etc., and it possesses every one of the properties which were admitted to be essential to the old wrought iron as contrasted with steel, viz.: inability to harden, considerably lower tensile, compressive, etc., strength, lower resilience, etc.

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February 28, 1877, in opening the discussion on the motion to adopt the report of the International Committee on the Nomenclature of Iron and Steel.

However, the new wrought iron has several qualities which were incidentally present in some of the varieties of steel, absent, however, in the others, and always absent in the wrought irons formerly made; viz.: it is made in the same furnaces in which some varieties of steel are made, but in which none of the old wrought irons could be made, and in which many of the old classes of steel could not be made. So cake is made in the same pans that bread is. It also has practically perfect homogeneousness, which some of the old steels had, which many of the old steels could not have, and which none of the old wrought irons had.

That it has any other qualities which the old wrought irons had not, and which the old steels had, I deny. I challenge the mechanical engineers to produce evidence tending to disprove these positions, or to show that homogeneousness was ever considered essential to steel.

Now, certain mechanical engineers and manufacturers, many or most of whom were pecuniarily interested in attaching the name steel to the new products, because that name was associated in the mind of the public with superiority, have called these new products steel, in full face of the fact that they had none of the essential qualities of steel, and all of the essential qualities of wrought iron. They have called them steel, partly because made in the same furnaces that steel was; partly because they are homogeneous (while many of the old steels could not be homogeneous), and partly for commercial reasons. Metallurgists have generally concurred in calling them steel under silent protest, because no other name was offered, and because they were offered for sale as steel, just as we have spoken under silent protest of "silicon steel," knowing that it was not steel, and that it had practically no silicon; or as a naturalist might speak to a fisherman of a whale as a fish, knowing all the while that it was not a fish, but a mammal. Not content with this, these mechanical engineers have coolly proposed a nomenclature which should class these new wrought irons as steel, and should class many of the varieties of steel as wrought iron, basing their classification on the presence or absence of homogeneousness, a quality never considered essential to steel, and disregarding every one of the qualities which have heretofore been deemed essential to steel. They say that blister steel, shear steel, puddled steel and German steel are now, to please their mechanical majesties, wrought iron.

Now, several metallurgists have protested against this gratuitous upsetting of the landmarks of our metallurgical language, and have replied to the mechanical engineers that it would seem wiser not to throw away the well settled and useful division of the iron-carbon products into wrought iron, but to supplement it by employing some new term to indicate the presence or absence of the qualities which have newly become so useful and prominent in their new wrought iron.

We have urged that the gratuitous change they propose will destroy the very convenient general carbon classification which can perfectly well co-exist with a supplementing fusion classification, and that the change would cause much needless confusion and inconvenience.

At Prof. Egleston's wise suggestion, an international committee has proposed the nomenclature we now discuss.

I have arranged these three classifications—the original one, that of the mechanical engineers, and that of your committee—so as to show their relation to each other, omitting the less important varieties of iron for brevity. I have first arranged the more important varieties of malleable iron in the way which a strict adherence to the old classification would necessitate; and throughout the table I have given in capitals the varieties which come under the head "steel" of this classification, and in italics those which here come under the head "wrought iron."

MALLEABLE IRON.

Original Classification.

I. *Cannot harden—Wrought iron.*		II. CAN HARDEN—STEEL.
Puddled iron.		BLISTER STEEL.
Bloomary iron.		PUDDLED STEEL.
Malleable castings.		SHEAR STEEL.
Bessemer iron.	CAST STEEL.	BESSEMER STEEL.
Martin iron.		MARTIN STEEL.
Crucible iron.		CRUCIBLE STEEL.

Mechanical Engineers' Classification.

I. Has not been fused—wrought iron.	II. Has been fused—steel.
BLISTER STEEL.	*Bessemer iron.*
PUDDLED STEEL.	*Martin iron.*
SHEAR STEEL.	*Crucible iron.*
Puddled iron.	BESSEMER STEEL.
Bloomary iron.	MARTIN STEEL.
Malleable castings.	CRUCIBLE STEEL.

International Committee's Classification.

I. *Cannot harden—iron.*			II. CAN HARDEN—STEEL.	
Puddled iron.	A, has not been fused—*weld iron.*	Weld Metal.	A, has not been fused—WELD STEEL.	BLISTER STEEL.
Bloomary iron.				PUDDLED STEEL.
Malleable castings.				SHEAR STEEL.
Bessemer iron.	B, has been fused —*ingot iron.*	Ingot Metal.	B, has been fused—ingot steel.	BESSEMER STEEL.
Martin iron.				MARTIN STEEL.
Crucible iron.				CRUCIBLE STEEL.

The steel of the mechanical engineers' classification, it will be seen, embraces three important varieties of wrought iron of the original classification; while the wrought iron of the former has also three of the varieties of the steel of the latter. The violent metathesis, this changing altogether the grouping of the varieties, thus taking three varieties from the class steel and replacing them by three entirely dissimilar ones, is what Mr. Holley calls *enlarging** the term steel, and seriously compares it with embracing anthracite under the head of coal; saying that anthracite does not cake in burning, while bituminous coal, which was the first in general use, does cake. The trifling difference between the cases, that anthracite has every quality which was considered *essential* to coal before anthracite was used, while the new wrought iron has no one of the properties which have been always recognized as essential to steel, and every one of those which have been recognized as distinguishing wrought iron from steel; and the difference that the recognition of anthracite as coal removed no other species from the class coal, while to call the new wrought iron steel compels Mr. Holley to remove three species from the class steel to the class wrought iron. These trifling differences, of course, do not interfere with the aptness of Mr. Holley's simile; any one who cannot see the parallelism of the two cases must be suffering from mental strabismus, and I suggest his visiting Dr. Brown-Sequard to have his thinking apparatus put in order.

Examining the original classification, it will seem that the first three species, both of its wrought iron and of its steel, have not been fused, while the last three have been. Here, then, we can easily introduce a fusion classification, by dividing at once (I.) the wrought iron and the steels into (A) weld metal, which has not been fused but merely welded together, and (B) ingot metal, which has been cast into malleable ingots when fluid; the ingot metal into (B) ingot iron

* *Trans. Am. Inst. Mining Engineers*, vol. ii. p. 138.

and (II. B) ingot steel, and the weld metal into (I. A) weld iron and (II. A) weld steel. This is precisely what your committee has done, as will be seen by comparing their classification with the original one.

As to the merits of this classification I will only say that (recognizing the necessity of indicating the presence or absence both of the fusion and of the carbon properties), while it does not disturb the existing carbon classification, it supplements it with a simple fusion classification, which is quite independent of it, the two being co-ordinate yet distinct. The terms of the former are practically the same as heretofore, the terms weld and ingot of the latter being simple, clear and concise. The compounding of the two can give rise to no confusion; and the compound terms indicate clearly and tersely, in every case, the presence or absence at once of the carbon qualities and of the fusion qualities. It introduces a new, inevitable, and necessary element into the classification, without disturbing the previously existing elements.

We have now a not unimportant duty. These two classifications, the one proposed by the mechanical engineers, the other by our own committee, have been offered, and it rests with us to decide, once and for all, the nomenclature of iron. It is almost inevitable that one or the other of these classifications should be henceforth adopted, either as they are now before us, or as they may be modified by us. It is imperative and absolutely unavoidable that the present nomenclature should be so modified as to make the new product a distinct class by itself.

The question is, How can this new class be introduced with the least difficulty and confusion, and yet leave the classification of iron clear and systematic? Whether this change shall be made in the rational, wise manner advised by your committee, or in the irrational, confusing way into which the iron manufacturers have stumbled, and of which a portion of the public has heard enough to muddle its ideas, it is your duty to decide. The present is a rare opportunity for you to exercise wisely and calmly an all-sufficient power in simplifying the nomenclature of this most important branch of metallurgy; a nomenclature which is in constant use with a very large proportion of the civilized world.

Unlike the introduction of the metric system, your committee's classification will introduce no radical changes; for the old words, cast iron, steel and wrought iron, will mean precisely what they have always meant to the whole world until within a few years, and what even to day they mean to all but a small fraction of those who speak them. And even to this fraction, the change will not be a trying one. For the name of the new wrought iron, which they have called steel, alone will be changed for them, and it will be called iron, with which it has every property in common, instead of steel, having with the steel with which they are most familiar only the property of homogeneousness in common.

I repeat, it is a rare opportunity. Your committee's classification, if adopted, would be sent out with great weight. The unanimity of so competent, so impartial, so well-known, and so universally respected a set of men, truly representative men of so many different countries and races—the Scandinavian, the Anglo-Saxon, the Teutonic, the French—will carry great weight. The ready acceptance of the classification by the Germans, even without your approval, assures us of the ease with which it would be universally adopted, if sanctioned by so august and competent a body as yours; especially if your members (many of whom are so very influential in the iron industry) exert their individual influence to promote its acceptance and introduction. If the classification of the mechanical engineers is to be rejected, now is the time to do it—to nip it in the bud before it has got saddled on us, and to offer in its place your committee's classification. To reject the latter, would be regarded as a virtual acceptance of the former by its energetic advocates.

The great objection raised against your committee's report is that it retains the established classification, based on the extent to which the carbon properties are present. The essence of Mr. Metcalf's eloquent and able attack at the last meeting was:

"The committee's classification is unscientific, because it separates wrought iron from steel, according to the extent to which the carbon properties are present; these classes must shade into each other, and you will have to separate them by an arbitrary and, therefore, unscientific and unendurable line.

"The mechanical engineers' classification is scientific, and it separates cast iron from steel according to the extent to which the carbon properties are present; these classes must shade into each other, and I shall be able to separate them by an arbitrary (and therefore scientific and gratifying?) line!

"Let us leave deep argument to those who will not swallow my consistent classification."

Mr. Holley has given us much more in the same vein, ending with the grand dictum: "The names of new materials and processes, like the laws of trade, are not fixed by the arbitrary edicts of philosophers, but are gradually developed to meet the general convenience."

This is the great and constantly repeated charge against a carbon classification, indeed the only charge worthy of the name of argument, viz.: that its classes inevitably shade into each other, which makes it so intolerable that its very terms are to be appropriated for the needed fusion classification. This arises from what seem to me philological misconceptions, and it must be discussed, not on mechanical or metallurgical, but on philological grounds.

Classifications are based upon important differences between the classes they separate. Occasionally the differences between classes are so marked in all cases, that we can divide them easily by a very broad line, and that there are no intermediate cases which lie near the dividing line. Such are our divisions of most animals into male and female, of words into monosyllables, dissyllables, etc.

By far the greater number of classifications, however, including the greater number of the most useful and important ones, are to a greater or less extent arbitrary. Even most of those which at first sight appear most clearly marked, on further examination are found to separate classes which blend into each other imperceptibly. Such are our most important divisions in natural science, and such are most of the most valuable and useful classifications employed in the arts.

TO BE CONTINUED.

ROYALTIES IN COAL MINING.

From Report of H. S. Poole, Esq., Inspector of Mines for Nova Scotia.

(*Concluded from page 241.*)

As to the actual sums paid as royalty to the owner of both land and minerals, Mr. P. W. Sheafer, the well-known mining engineer of Pottsville, kindly informs me that in the Southern Anthracite field a royalty varying from 25c. to 50c. per gross ton mined and shipped to market is paid, the average being about 35c. From the best collieries 50,000 tons is about the minimum quantity required to be annually mined. In cases where the coal lands are sold and no rights to royalties are reserved, the price varies from $100 to $1,000 per acre. On an average the price is $500 per acre.

Mr. T. M. Williams, Inspector of Coal Mines in the Wyoming Region, has had the kindness to give me the result of his experience, and to state that the prices, rents and royalties depend so much on the thickness of the seams, the number of the seams, the thickness of the overlying strata, the conveniences for extraction and transportation, etc., etc., that they vary considerably; and that the selling price ranges from $300 to $1,200 per acre; the royalty varies from 12½c. to 30c. per ton, and on an average is 25c. per ton on all coals that have passed over screens of ⅝ to ⅞ inch mesh. And that when the minimum output is not reached, an equivalent rent of from 40c. to $1 per acre is exacted.

Mr. Andrew Roy, Inspector of Coal Mines for Ohio, has placed me under obligations to him for information respecting the bituminous coal fields of the West. He informs me that the price of coal land ranges from $60 to $500 per acre, and that the average selling price in Ohio is about $150 per acre, in Indiana $100 per acre, and in Illinois $75 per acre. Little renting of coal lands is done west of Ohio, and when sold they are dearer in Illinois than in Iowa or Kentucky. In north-eastern Ohio, the royalty charged ranges from 25c. to 75c. per ton, and the coal lands sell from $150 to $500 per acre. In south-eastern Ohio the lands sell from $50 to $150 per acre, and the royalty ranges upwards from 6¼c. per ton. The average in the State may be set down at 25c. per ton.*

In the north of England, Bainbridge writes, rents and royalties vary from 5 to 14 per cent. of the value of the coal.

The toll tin rendered by the free-tinners of Cornwall to the lord of the soil was, until lately, one-fifteenth of the produce.

In the High Peak of Derbyshire, the duty paid to the Crown in right of the Duchy of Lancaster, is usually one-nineteenth part of the lead ore raised; though a full tenth is said to be due. The lord is also entitled to "cope" sixpence for every load of ore carried off the ground.

Mr. Warington W. Smyth, H. M. Inspector of Crown Mines, and lecturer on mining at the Royal School of Mines, London, replying to an inquiry of mine on this subject, kindly wrote the following concise *resume:*

"The royalties, as a rule, in Continental countries are very much lower than in the British Islands, being there almost universally connected with the idea of the minerals being the property of the nation and worked under restrictions, carried out by national officers, whether Imperial, Royal, or Republican, who have charge of the districts, ordering certain works, restricting dividends, etc. Prussia, and Germany generally, used to suffer under a great multitude of imposts, which, I believe, are merged in a royalty of two per cent. on the gross produce. In France and Italy the royalty is taken upon the profits instead of the gross. In great Britain it is usual, except with iron ores, to take a fractional part of the whole as royalty or dues payable to the owner of the mineral. You know that here there is no properly so-called royalty, *i. e.*, sum paid to the government, except for mines which happen to be in Crown lands. In the north, the proportional dues have been from one-fifth (retained so high only in a few cases) to one-seventh, and to one-tenth the more frequent. In the south and west (Wales and Cornwall) one-tenth is the highest and is now unusual, because of depth, water, etc. It is more commonly from one-tenth to one-eighteenth; and in the case of old and deep mines one-eighteenth to one-thirtieth is not uncommon. One-fifteenth may be looked upon as the highest limit in the westernmost counties, and this refers to all the metallic minerals.

Where a money rate is placed as the due on iron ores, it is from 4d., as in some poor stratified oolitic, etc., ores, to 6d. or 9d. on common ores, and to 2s. 6d. per ton on special and well-placed hæmatites. During the prosperity of two or three years ago, I heard of 3s. 6d. and even 4s. 6d. per ton being offered to private owners as royalty on hæmatite in the Furness district.

With coal, from one-eighth to one-twentieth of the selling price is sometimes required, but there are many other ways of taking the royalty, as you probably know—all sorts of rates, from 3d. up to 2s. 6d. per ton, and ways of paying per acre, or per foot thick per acre. . . .

When leased mineral rents I have to deal with run from £5 in unknown speculative cases to £2,000 a year when the mineral is pretty certain.

Dunn, in the Winning and Working of Collieries, published twenty-five years ago, states that the royalties in the north of England then varied from 6d. to 12d. for round coal, and from 2d. to 4d. per ton of small coal, and in Scotland and elsewhere, from one-twelfth to one-fourth of the value sold. Throughout Lancashire and the neighboring counties the coal is let and sold by the Cheshire acre, which consists of 10,240 square yards; the statute acre being 4,840. The rent is levied at so much per foot thick per acre, the said footage ranging from £40 to £140 per acre. The measurements are made half-yearly. By this system it is clearly to the advantage of the lessee to produce the greatest possible yield per acre. The available produce of ordinary mining may be stated at three-fourths of the gross contents.

The above mentioned rate would be equivalent to a royalty on the gross contents of from 3d. to 10d. per ton. Mr. Ashworth, of Burslem, informs me that now the rents in Lancashire vary on an average from £70 to £100 per foot thick of coal, per Cheshire acre, while about Burslem the rents vary from £30 to £40 per statute acre. Where coal and slack are paid for by the ton sold, the price averages 10d. for round coal and 5d. for slack.

Hislop, in his Colliery Management, 1876, treating of mineral leases, after referring to *fixed rents on tonnage*, says a second mode of leasing coal is by *proportion*, or payment of fixed portion of the selling price. It is very equitable in principle, being lighter on the tenant in dull times, and only heavier when he is better able to bear it; but the trouble is to arrive at a fair value. A third mode is to *lease by the acre*, as already referred to in the extract from Dunn's Winning and Working of Collieries.

The tributers at the gold mines of Nova Scotia recognize the equity of payment of royalty to private individuals holding leases from the Crown, for they agree with such lessees to "take a lay" at 5 per cent., or 10 per cent., or even 25 per cent. of the value of the gold product from leads of proved value, in preference to paying to the Department of Mines $2 an area and only two per cent. of the product for unproved lands. The sums so paid to private individuals are as rightly called "royalty" as those paid by the direct mineral lessee into the Provincial Treasury.

* In parts of the anthracite regions of Pennsylvania the royalty is based upon the selling price of the coal. Some of the Lehigh collieries pay as royalty 15 and 18 per cent. of the price of coal at Mauch Chunk, this being the point up to which the mine operator pays the railroad charges (styled lateral tolls); from Mauch Chunk to the destination the consignee pays the tolls. The price of coal at Mauch Chunk is, therefore, a regular quotation, and easily ascertained. Collieries in the Wyoming region have been taken on the basis of 10 per cent. of the price of coal at Mauch Chunk. This method, in which the coal-owner shares the fluctuations in the market with the operator of the mines, is undoubtedly the most equitable, and it seems to grow in favor. There is sometimes, though not always, a different rate for the small sizes below "chestnut coal." And there is always a minimum royalty which must be paid whether any coal is mined or not, and, under the sliding scale lease, there is usually a minimum rate per ton also. In addition to this the lease often contains an agreement on the landlord's part to defray a certain amount of the expense of driving through rock, should the bed be found in fault and exploration work through rock become necessary.—ED. E. & M. J.

Mr. Richard Brown, whose carefully compiled book on the Coal Fields and Coal Trade of Cape Breton will always be a standard authority on the early history of the trade, gives in detail the several leases issued by the Imperial Government to work the mines of Nova Scotia. On referring to his book it will be seen that in 1792 a lessee agreed to pay a royalty of 3s. per ton. In 1802 William Campbell paid 4s. a ton, and subsequent losses in 1813 and 1821 paid a royalty of 3s. 8d. and 3s. 6d. per ton. In the following year Messrs. Bown took a lease at 4s. 3d. per ton. In 1825 the grant of all the unreserved mines and minerals to the Duke of York was given, and in it the royalty was fixed at 1s. sterling per ton. The General Mining Association who obtained the rights of the Duke of York also, three years later, leased from the Local Government the reserved mines, and it was agreed by all the parties concerned that the royalty should be 2s. currency per Newcastle chaldron, equal to 10d. per ton. The dues to the Duke of York under the sublease to the General Mining Association were at the rate of 8d. per ton. Then by a subsequent agreement between the Crown, the Local Government, the creditors of the Duke of York, and the Association, which need not be touched upon further here, in 1858 the present arrangement was effected.

Mr. Brown also states that when the country was a French colony, Governor Denys obtained a concession in 1654 from Louis XIV. of the whole island of Cape Breton, with full powers to search for and work mines of gold, silver, copper and other minerals, paying to the king one-tenth of the profit. And further that M. Duchesneau, the Intendant of France, in 1677 recognized and established Denys's right to exact a duty of twenty sous per ton from all persons taking coal from Cape Breton.

The Local Government of British Columbia, retaining the same rights and privileges as the Crown retained in Nova Scotia, have leased some coal mines at a royalty of 10 cents per ton; but they also require in addition an annual rent of $100, which, of itself, is a very nominal sum for a company working a lease to pay. It is, however, sufficient to check monopolists from taking out leases of large areas and holding them at no expense (as is done here) against a possible rise in value of coal lands and making an advantageous sale. It is to be regretted that a similar annual rent is not required from lessees in this province that *bona-fide* miners might be separated from monopolists. At present the only anxiety that the latter have concerns the royalty after 1886; for the uncertainty of the future rate as the time approaches militates more and more against their prospects of a sale.

AMERICAN STUDENTS OF MINING IN GERMANY.*

By J. C. Bartlett, Cambridge, Mass.

As American students of medicine, philosophy, philology, music, history, or art have found it necessary or highly advantageous to supplement their course of study at home by a residence of some years at a foreign university, so, ever since mining has been practiced in this country in any other than a rude and wasteful manner, many American students of mining have sought in London or Paris, but chiefly in the Academy of Freiberg, Clausthal, or Berlin, such information and experience as would give them confidence in themselves, and make them worthy of the confidence of those wishing the services of mining engineers.

But a broad distinction must be observed. Medicine, philosophy, philology, music, history and art are universal sciences; their theory and application are much the same throughout the civilized world; moreover, the principles of justice which underlie law, and the principles of mathematics, mechanics, chemistry and geology, upon which the sciences of civil, mechanical and mining engineering are founded, are also universal, but their practical application depends upon local conditions. The economy of mining is a function of such variables as government, labor, wages, distance, quantity and kind of ore, timber, water and transportation, and to many it seems as absurd to attempt to obtain in any other country the knowledge to fit one to practice mining in America, as it would be to attempt, by studying law in a German university, to fit one's self for practice in the New York courts.

A young man who has decided to fit himself as a mining engineer is at a loss how to begin. On the one hand, he is told that our schools are not practical enough, that practical miners do not find the graduates capable of doing what they profess, and that he should study abroad, where theory and practice are united. On the other hand, he is informed that American methods differ from the foreign so fundamentally that, if he studies abroad, he must afterwards unlearn everything, and to learn mining he is advised to "go West," which now celebrated advice is somewhat indefinite. Truer but hardly less sweeping and discouraging is the opinion of the Commissioner of Mining Statistics, who said of the graduates of foreign schools, "Every such graduate has to reconstruct, alone and for himself, the whole art which he has learned—a work requiring genius as well as intelligent perseverance." It is, nevertheless, a fact that a large part of the prominent mining and metallurgical engineers and professors of our country have been students abroad, mostly in Germany, and it is fair to assume that their training was an important element or cause of their success; and since the annual exodus still continues, the belief is evidently widespread that our schools do not yet furnish all that is necessary, or even the most important part.

In view of the immense universal wealth of the country, in view of the present enormous production and the more enormous waste, in view of the fact that mining industries will always remain among the most important sources of national wealth and prosperity, the subject of the education of miners and mining engineers demands of this society earnest thought, thorough discussion, and, what is not to be forgotten, subsequent action. Moreover, the subject should be considered by itself, and not in connection with mechanical or civil engineering. In discussing education in general, we may come to general conclusions; in discussing technical education, to most definite conclusions, and in discussing mining technical education, we may reach still more definite and directly applicable results.

In the discussions of last February and June the two questions presented were not answered decisively, and perhaps they were questions not admitting unqualified answers; but much valuable light was thrown upon the whole subject, and an agreement was reached on some other important points, which, it will be noticed, were points of general technical education.

If civil, mechanical and mining engineering are distinct enough to form three independent professions, the proper preparatory courses for each have points of distinction enough to warrant an independent discussion. We have had the general discussion—what we need is the special.

How, then, do our schools correspond to our mineral resources and existing appliances? Are American methods of mining and metallurgy, or foreign methods, or any definite methods taught in them? Are the attractive courses of the various catalogues and prospectuses given to students in reality? Are the requirements for the degree of mining engineer sufficiently exacting in theories and practice? These questions are asked in no spirit of criticism, but for information, with the hope of obtaining it for the benefit of present and future students, on the one hand, from engineers of the Institute, who are in practical life, and, on the other hand, from the professors in our schools. These questions are suggested to promote discussion, that the students may learn what is desired and will be expected of them as young engineers; that they may be told where and from whom they may learn what they lack; that the faculties of our schools may know what changes to introduce, to make the courses more efficient, and that out of this discussion may be devised some means of establishing some connection between the schools and the mines and metallurgical works, so that our students may enjoy some such advantages as they are favored with abroad.

It may be well to consider some of the advantages and disadvantages of the German instruction, and to give some of the actual experiences of the American student in Germany. For this purpose, the academy at Freiberg will be considered, because it is there that the greater number of our past students have studied; the greater number of those now abroad are there, and it is the school with which the writer is best acquainted.

Admission to the academy is very easily obtained. If the applicant from a foreign country can understand what the Director says to him when he makes personal application, and can speak a very moderate amount of German, and can produce a diploma awarded to him by any college or technical school, that is sufficient. Not having a diploma, he may, instead, pass an easy examination, much similar to that required by our own technical schools for admission. In the statutes we read, "In suitable cases, especially in the case of applicants from foreign countries, the Director may dispense with the admission examination." We also read, "Older and independent persons, and such as have already completed higher technical studies elsewhere, may be permitted by the Director to attend lectures and practical exercises, upon the payment of the regular fees," etc. Such students are called Hospitanten, and correspond to our special students. Under these liberal regulations, there is no difficulty in entering. I have heard of one American, some years ago, who could not gain admission, but he was so totally deficient that he has not learned anything to this day. It seems to be the desire to make the entrance easy, not for the sake of securing students, but to avoid throwing hinderances in the way of those wishing to learn; and, in general, the kindness of the Director and of the Professors to all foreign students is very marked and gratefully acknowledged. This leniency, often a desirable accommodation for the mature student, is often a serious disadvantage to the young student not familiar with the German language. Not being able to understand much of the lectures, and his previous education not having been such as to enable him to pursue intelligently the mathematical studies of the course, he quickly becomes discouraged and lazy, and too often yields to the manifold temptations of Freiberg life. At all events, the foundation being poorly laid, the superstructure is insecure. Too easy entrance examinations are not a peculiarity of foreign schools.

The theoretical instruction is mainly imparted by lectures, a system which is perhaps the best for highest instruction of the universities, but which in a technical school, where hardly more than the elements can be given, it is very wasteful of time and unsatisfactory. If a professor has something original or new to offer, or if his subject is one on which good books are rare or expensive, then lectures are justifiable and necessary; but to give entirely by lectures a course on ordinary mathematics, mechanics, surveying, mining, theoretical chemistry, or any subject on which there are scores of good and inexpensive books, is a wicked waste of the time of professor and students. To illustrate, let us suppose the subject is mining, and the particular subject for the day is power drills. The lecturer gives, perhaps, a short history of the invention of the steam or compressed-air drill, and then proceeds to discuss the various systems; he makes an elaborate freehand drawing of a steam drill, and lectures while he draws. Now the student may take his choice; either he may copy the drawing as well as he may, being, perhaps, a poor draughtsman, or he may write the description and criticisms; but, recognizing the uselessness of having one without the other, he generally tries to get both, and if he writes an intelligible description he may have time to copy half the drawing itself before the figure is rubbed out to make room for something else. Or perhaps the student devotes his main energy to the drawing and keeps pace with the professor, when suddenly the latter discovers that he is making his drawing out of propertion, and with a stroke he erases a third of his work. The student who is working with ink or pencil can not introduce changes so easily and neatly. He scratches or rubs out or begins again, and perhaps gets a passable drawing and a fair description. Meanwhile the professor has drawn and described another drill, and closes his lecture with the remark: this last drill is in general use; the one before it has long since gone entirely out of use. Let us suppose the student hears lectures on some mathematical study. At his room he conscientiously rewrites and studies his notes, and finds that he has omitted important steps in the reasoning; he misses a lecture perhaps, and not being able to make good the deficiency without copying the probably imperfect notes of some friend, he loses his enthusiasm, goes to lecture less frequently or finally not at all. These are not fanciful examples, but such as are occurring constantly. It requires much more determination and perseverance than can reasonably be expected of a young student, though he starts with the resolution and enthusiasm, to write, rewrite and annotate a whole treatise on each of the studies he pursues. And when he has it all done, he may find nine-tenths of it more fully given and better expressed in any of the excellent text-books. Add to these objections, which apply in the case of all students, the fact that the art of writing German rapidly, of paraphrasing a lecture, is not easy for a foreigner to acquire, and we may imagine how little good our students would acquire if the main benefit of a residence at Freiberg were to be gained from the lectures.

Connected with some of the courses of lectures there are weekly recitations which are very thinly attended, sometimes as few as two or three or even none out of a lecture division of thirty or forty being present. This non-attendance proceeds from various causes; some students may have been irregular at lectures, many do not take the trouble to read their notes, at least for months or till just before the final examinations; some are not willing to make an exhibition of bad German, and some have not been able to get enough out of the lectures to be questioned on.

As regards discipline, the school is conducted on the most liberal principles, the student being allowed to select such lectures and practical exercises as he wishes, and to attend or not as he may choose. The only exception to voluntary attendance which appears in the statutes is contained in the following extract, "Students who receive scholarships, or for whom the fees have been entirely or in part remitted, are required (*verpflichtet*) to attend the recitations," which significant clause implies that recitations are important, and so important that mild coercion is justifiable. As foreign students receive no pecuniary assist-

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

ance, but are charged $25 a year more than other students, this restriction does not apply to them. Moreover, students are not required to give any proof of progress unless they are candidates for a degree, and then only at the end of their course. In consequence of this freedom, many who are registered as students scarcely ever attend any lectures or other exercises. Sometimes an example is made and a young man is sent away, invariably for neglect, but in such cases it will be found that he was otherwise a bad character, and had made himself notorious in the town. This *laissez-faire* principle may be allowable for the oldest and best students, but for the greater number, especially for those away from the supervision of home and the more exacting social restraints of our country, it is certainly pernicious. It is seeking for itself a foothold here, but it is to be hoped we shall stand by our practice of requiring proof of progress, regularly and frequently. It is said that a student who is required to prepare a certain number of pages for a recitation, or a certain subject for an examination, does not have the proper object of study placed before him; that he ought to be encouraged to study for the love of knowledge. This is perhaps the kind of suasion to apply to those who are destined to become ardent lovers and devotees of abstract science; but becoming a successful engineer is probably as lofty an object as the ordinary student of mining will appreciate, and the advisability of showing him from time to time just how far advanced he ought to be, and whether he is actually up the mark, is a sufficient reason for recitations and examinations. Habits of industry, as well as facts and theories of science, are to be inculcated and maintained. The German school acts on the assumption that such habits have already been inculcated in the preparatory school—an assumption not justified by experience. We cannot afford to allow a promising but lazy fellow go to ruin through neglect, and we ought, for the interest of all concerned, to weed out, long before the end of the course, such as nature plainly intended to shine in some other sphere of usefulness. It is also said that our young men are too old and manly to be treated longer as schoolboys, and, now that it has been suggested to them, the young men themselves feel that their dignity as gentlemen is wounded. But at West Point or at the Naval School, where honor is generally assiduously cultivated and carefully guarded, the young men still continue to bear up under the degradation of being obliged to turn out early and make their own beds, or stand up stiff and straight before a blackboard and demonstrate a proposition in military style. A certain amount of discipline is necessary for efficiency in any body of men, be they men or really boys, and especially is strict discipline necessary for those who expect afterwards to exercise authority.

In what, then, does the superiority of the German Mining Schools consist? Why do our young men pass by our magnificently endowed and appointed schools without entering, or pass from them to spend two or three years at considerable expense and discomfort at Freiberg? It is mainly because the Freiberg academy gives its students the union of science and art; because it furnishes them with ample facilities for learning, either within its walls or in the neighboring works, or somewhere in Saxony, or somewhere in Germany the *practice* of the various processes of mining, concentration and smelting. Moreover, it is distinctly a school for mining and metallurgy, untrammeled by any connection with mechanical or civil engineering; its professors are specialists, generally of the highest ability; there are no fancy courses in its instruction, and no more than two or three courses which might perhaps be considered superfluous. The following is a list of the professors, the subjects of instruction, the number of hours of lecture given weekly in each subject, and the practical exercises:

GRETSCHEL—Higher Mathematics (Trigonometry, Analytic Geometry and Calculus), 6; Selections from the Higher Mathematics, 2; Descriptive Geometry, 4; Introduction to the Theory of Determinants, 1; Graphic Calculation, 1.

UNDEUTSCH—Mechanics, 6; Mining Machinery, 4; Machine Drawing, part first, 4; Machine Drawing, part second, 4.

VIERTEL—Geodesy and Mine Surveying, 3; Practical Exercises in the field (Summer term), ½ day; Practice in Surveying, including Mine Surveying, ½ day.

WINKLER—Inorganic Chemistry, 4; Organic Chemistry (Summer term), 2; Chemical Technology, 2; Quantitative Analysis, 1; Practice in Qualitative and Quantitative Analysis, from 9 to 6 daily except Saturday; Volumetric Analysis, 1.

RICHTER—General Metallurgy, 4; Assaying, 1; Practice in Assaying, ½ day; Blowpipe Analysis, 2; Practice in Blowpipe Analysis, 2.

LEDEBUR—Metallurgy of Iron, 4; Metallurgical Technology, 4; Salt Works (Summer term), 1; Assaying of Iron (Winter term), 1; Practice in Iron Assaying (Summer term), ½ day.

WEISBACH—Mineralogy, with one hour recitation, 5; Practice in Determining Minerals, 4; Mathematical Crystallography (Winter term), 1; Practice in Determining Crystals (Summer term), 1; Pseudo-morphology (Summer term), 1.

STELZNER—Geology, with one hour recitation, 5; Ore Deposits, 2; Petrifaction, 2; Microscopic Examination of Minerals and Stones, 1; Practice in the same, 1; Practice in Determining Rocks (Summer term), 1.

ERHARD—Experimental Physics, 5; Practice in Physical Manipulations, 2; Fuels and Furnaces, 2; Meteorology (Winter term), 2; Mathematical Examination of the Physical Properties of Gases, 2.

KREISCHER—Mining, part first, with one hour recitation, 5; Mining, part second, with one hour recitation. 5.

MULLER—Construction of Buildings (Winter term), 3; Estimates for Mining and Smelting Buildings (Summer term), 3; Designing and Drawing of Mining and Smelting Buildings, 4.

FREIESLEBEN—General Law (Winter term), 4; Mining Law, (Summer term,) 4.

SCHOBER—Political Economy, 2.

WALTHER—Hygiene of Miners and Smelters, 2.

OSTUCKENBERG—Freehand Drawing, 4.

Great satisfaction is universally expressed with the lectures and practical exercises under Richter, Gretschel, Winkler, Weisbach, Stelzner, Viertel and Ledebur. These departments are the strong attractions of the school, and better instruction than is given in the practice of wet and dry assaying, blowpipe analysis, chemical analysis, mineralogy, geology, surveying and survey plotting, could not be asked. Moreover, the large and valuable collections of minerals, geological specimens, and models of machinery are accessible for inspection or study. With the professor of mining, or machinery, or geology, or iron, the students occasionally, perhaps two or three times in a year with each, have the opportunity of visiting works or making geological tours in and out of Saxony.

These trips are sometimes of profit professionally, but a crowd of twenty students spending several hours only in large and complicated works, passing rapidly from one thing to another, cannot be expected to carry away much definite information or many lasting impressions. The geological trips are perhaps the most useful and enjoyable; the study of the Quadersandstein of Saxon Switzerland is not so engrossing that the beauties of this charming region pass unadmired; the wonderful formation of the Prebisthor does not preclude an appreciation of its beer, and the tramp over the wooded hills or through the cultivated valleys is enlivened by those glorious German student songs.

DISCUSSION.

The CHAIRMAN, after praising the ability and discriminating judgment of the paper of Mr. Bartlett, said, with reference to that gentleman's citation of opinions from one of the early reports of the U. S. Commissioner of Mining Statistics, relative to the establishment of a National School of Mines, that his own views had undergone some modification since that expression of them, or, rather, circumstances had changed, partly through the rapid extension and improvement of local technical schools, and partly through the labors of the Institute of Mining Engineers, so that the crying need of a governmental institution to unite and elevate the profession no longer clearly appeared. This change of the situation, added to the sense which he had always entertained of the danger of failure in attempting to maintain a school of the kind under the supervision of a government republican in form, and peculiarly exposed to changeful partisan control, led him to say that he did not at present feel inclined to urge the establishment of a National School of Mines.

With reference to the advantages of study abroad, he thought Mr. Bartlett had, perhaps, not sufficiently emphasized two elements of profit which study at home could not replace, namely, the acquired familiarity with one or more foreign languages, and with foreign technical practice. These are gained almost incidentally, like extra premiums thrown into the bargain. Their value throughout a professional career is scarcely to be estimated.

While it is quite true that the system of instruction by lectures alone is deficient in that patient training which American students, not college graduates, are likely to need, and which German students have usually received in the *gymnasium*, it must not be forgotten that the professors at foreign technical schools are extremely cordial to American students who show themselves to be in earnest, and that they devote much time, outside of lecture hours, to friendly assistance of deserving and appreciative pupils in special or regular courses. Mr. Raymond said that this sympathy and co-operation often extended through many years after the departure of the student from the school. He had no doubt that the experience of many graduates at Freiberg, now members of the Institute, would corroborate his own in this respect. He had received at intervals for sixteen years letters from his old instructors at that school, full of information, news, scientific and professional suggestions, etc., freely tendered and most valuable. No doubt a similarly pleasant and profitable relation existed between the professors and the graduates of most technical schools. Whenever this was not the case, it was usually the fault of the graduates, since nothing was in general more welcome to professors, more or less cut off by their duties from active career, than to maintain, through the young men whom they had trained, a vital connection with practice and progress.

With regard to the relations existing abroad between students and managers of works, Mr. Bartlett's statements were perfectly justified. As to the condition of affairs in this country, however, he must be allowed to say that he did not think secrecy a common evil here, and that our patent laws, however inconvenient they might be in some respects, carried this great benefit everywhere, that they abolished secrecy. The very word *patent* means something *open;* and experience showed that owners of patents desire nothing so much as to show them to everybody. In fact, as Mr. Bartlett would have occasion to find out, the difficulty was to avoid their importunities—not to break through their reserve.

Finally, he would suggest, that while it was perhaps outside the province of the Institute to attempt to establish an organic relation between students and the managers and owners of works, this object was in substance rapidly being accomplished by the very existence of the Institute, and by the *entente cordiale* insensibly arising between these two classes, both of which are numerously represented among its members and associates. He had yet to hear of the first instance of discourtesy or lack of professional hospitality shown by one member or associate of the Institute to another, while he knew of many instance of the free interchange of professional information and service, reflecting great credit upon the parties, and illustrating one of the chief benefits of the organization.

PROF. FRAZER said that there were one or two points in Mr. Bartlett's paper which deserved especial notice. In the main he agreed with the views and statements he had presented. Mr. Bartlett was, however, mistaken in saying that foreigners never received pecuniary assistance in Freiberg. He knew of one American student who had received aid, and there had also been one or two Hollanders who had been assisted pecuniarily by the government.

In 1867 and 1868 there were about forty Americans in Freiberg, comprising about half the school. The American students had preserved an excellent record for conduct, and had more than half the best scholars. There had been some little dissipation among them, but not generally, as among the Germans. The class to which foreign student life was the most dangerous comprised young men of property, who came to Freiberg without any definite desire to study mining engineering, or anything else, but to pursue the worst feature of student life. One of the greatest advantages of the Freiberg school was the intimate connection of the mines and works and the government, whereby opportunity was afforded for practical instruction, under the most favorable conditions; and the presence of these mines and works in the immediate vicinity of the school obviated the loss of time which would otherwise be incurred. Prof. Frazer did not think favorably of the *quid pro quo* suggested by Mr. Bartlett, that the schools should do expert work for the works in return for favors shown to students. He thought it would be an injustice to professional experts, many of whom had no other means of earning their living than by doing just the kind of work which it was proposed here to supply gratuitously to the shops. The result of such a plan must be that the *quid* would come out of the living of these experts; for the institutions of learning, being self-supporting and able to do much work as practice which would otherwise have to be paid for by manufacturers, would gain in numbers by the increased facilities this arrangement would enable them to offer students. The students are the gainers by this or any system up to the time of their graduation. After that time, unless specially provided for, such a rule would, more than anything else, keep them out of employment.

MR. J. FRAZER TORRANCE, of Montreal, said that it must be borne in mind, in considering the advantages which American students enjoy in visiting the mines and works in Germany, that the persons in charge of these works have themselves been in the schools, and are, therefore, able to understand the wants of the students, and to give them appreciative aid. He thought the last speaker had overrated the advantages of Freiberg as a place of dissipation, and considered it ill adapted to one who preferred spending money to study.

THE UNION MINE, TILT COVE (Newfoundland), are making preparations for opening up some new discoveries which promise to be of great value. Several shipments of rich nickel ore have also been made, but the quantities and percentage of metal we have been unable to ascertain.

LECTURES ON MINING.—No. XXXVII.

By Prof. W. W. Smyth, M. A., F. R. S., Royal School of Mines, London.

Having considered the preliminaries leading us to the working of stratified deposits, and especially the working of coal, we may now consider some circumstances in which they are worked on the post and stall, or pillar and room, or stoop and room system, which consists of open spaces (stalls or bords) of certain width between certain solid masses which are termed pillars or stoops. This system is very frequently employed in our own country and on the Continent. The antiquity of it is no doubt very great, because it will readily occur to you that if you saw the outcrop of a regularly bedded mineral, it would naturally be the case that you would make an opening of such a width that the roof would not require special support; and then, if you want to set more men on, you would leave an intervening pillar, and make another opening at a little distance. The opening out of a new district on this method could be seen not long ago in the Cleveland district, near Middlesborough. The openings were pushed into the side of a great hill, and as they advanced in of course the width of the pillars became less. The question resolves itself into this: What length of ground can be opened by means of these galleries or bords, and what width of pillars will it be necessary to leave?

We may refer, first, to the case of the working of building stones, on a somewhat similar method, except that in such case, the rock being strong, the pillars are usually left of small size. This may be seen in the quarries of Egypt and Hindostan. The pillars there are rectangular, and sometimes, if the ground is not very firm, the openings are made arched. The catacombs of Paris and Rome, and the caverns of Maestricht, have been wrought on a system not unlike this. There is nothing more striking, and more worth study by the student, than the working of the Upper Silurian limestone in the neighborhood of Dudley, which has for many years supplied the flux for the ironworks of Worcestershire and South Staffordshire. At Dudley, where the limestone dips deep, access is had by means of a shaft and cross-cut; chambers are then opened in it 16 yards wide, leaving pillars between 6 yards wide, which are holed through at intervals of 8 yards, for a distance of 8 yards; thus the pillars will ultimately stand in series each 6 by 8 yards. Another remarkable instance to be seen in our own country is that of the quarries at Box, near Bath. In this case, the stone being strong, the angle of dip moderate—almost flat—and the character of the rock such as renders it capable of being cut with a saw, there is a degree of regularity such as is scarcely to be seen in any other workings. The headings, or galleries, are 25 feet wide, and are crossed by others, leaving pillars between about 12 feet; the height of the stratum varies from 8 to 20 feet in the district. As mentioned before, they use a very long-handled pick in these quarries for the holing, and then cut away the rock with a saw; the pillars are left permanently for support. At the salt mines at Norwich, in Cheshire, as a rule, the bed is about 14 or 15 feet thick, and the openings are no less than 25 yards in breadth, a rib being left between 8 yards in breadth, which is again cut through at intervals. The tenacious character of the salt is remarkable: the lecturer had measured openings 36 yards wide, where there was no pillar to support the roof, and not a crack was visible. It is almost useless to leave these walls if they are afterwards to be abandoned to the water, and made into mere tanks of brine; the whole surface of the district is being so changed that it is a serious question what should be done. Only two or three of these mines are still working, the salt being usually obtained from brine. Another instance of pillar working, in which a few pillars do a large amount of work, supporting large openings between them, is to be seen in the neighborhood of Festiniog, in Wales, where the salt quarry passes from an open to an underground working. The chambers there are 15 yards broad, sometimes more, and the pillars between are of similar thickness. In consequence of the enormous waste of valuable substance left in these pillars, it becomes a question whether they are to be left as permanent supports for the roof, or left only to be removed more or less at some future time.

We may pass now to this system as more applicable to coal, and to seams of ironstone, as in North Yorkshire, where, however, the strength of the ground renders the pillars smaller than is generally the case in collieries. The history of the pillar and bord system is admirably illustrated in some of the works which have been published by the intervention of Committees of Parliament appointed to inquire into cases of explosions, especially those in 1835, 1848, and 1853; as also the reports prepared by Prof. John Phillips and Mr. Blackwell as to the desirability of Government inspection. The subject, as a whole, resolves itself, in the first place, into the question whether we are to consider the pillars as intended to be left for the support of the roof, to enable us to get away all the coal we can, or whether we are to look on them as being reserves of coal which we are to get out by proper means, when a suitable time comes. By this latter method, when the pillars are properly proportioned, it may be that a larger proportion of the coal will be gained, whereas by the old method (that is to say, the former of the two) it was by no means an unusual thing to find that 50 or 60 per cent. of the coal was lost. In some of the comparatively shallow workings in Durham this old system may be found still, where the coal is apt to become small in the pillars, and to be affected by oxidation. Three headways, or courses, are driven on the end of the coal, about 30 yards apart, and these are crossed by the bords, which in the shallower workings may be 4 yards broad, with a pillar of 1 yard between to support the roof. It will be necessary to widen the pillars at the end, making the entrance to the boring only 2 yards wide, otherwise the roadways will very soon be crushed. When greater depths began to be attained, it was found that pillars of neither 1, 2, nor 3 yards were sufficient to resist the pressure, which would tend to crush the whole system of these workings; or, what was still worse, sometimes a creep would be shown. Then pillars of 3 yards would alternate with bords of 4 yards wide, and unless the floor and roof are very unsatisfactory, you may hope that 4 yards will be quite sufficient, except at very great depths. But when it came to such collieries as began to be opened out at the end of last century in the neighborhood of Newcastle, larger dimensions were required. About the year 1795, Mr. Thomas Barnes commenced as a regular system the taking away of some of these pillars, and pointed out that they should, in the first instance, be left of extra size, in order that they might not be injured. In the commencement of these operations they were very cautious, and could obtain but a very small proportion. The method they attempted was to put in some strong stopping, and then to cut portions off the pillars at both ends. In this case you might expect the roof to fall in, and therefore destroy the roadways, hence it was necessary to commence these operations near the boundary. It then became a question whether you could dare to interfere with the neighboring pillars in this way, or whether it would let down the surface, as it probably would in shallow workings. Various methods of cutting the pillars were adopted; sometimes they took away the end of the pillar, at others they took a slice off each side, at others, again, a bord was driven through the central part of each pillar, or in some cases only a little of the middle part was taken.

When Mr. Buddle, supported by Mr. N. Wood, took up the question, he found that a very large portion of the mineral could be saved by these means, and very soon the percentage of coal obtained rose from 39 to 54 per cent., and then to 80 per cent. in some cases, when they could work off the intermediate pillars. At the same time another plan was introduced by Mr. Buddle, which was of high importance. He showed that running over the whole ground with these bords and headway courses was not an advisable plan; that you had then tens of thousands of yards of workings left open to the influence of the air, and, therefore, oxidizing at the same time that they were feeling the pressure from above. This tended to make the mineral lose its proper consistency and strength, and when you came to work it you found it more or less damaged. It was proposed, partly on account of the ventilation, partly to prevent this damage to the coal, that only a limited era should be worked at a time, that when you had a certain portion of ground thus broken by these bords, you should proceed to get the pillars. Mr. Buddle's plan, in fact, was to divide an extensive royalty into areas which should be termed panels, and this was termed panel working. Between the panels there will be strong ribs of coal, from 40 to 60 yards thick, and having between them and the main lines of thoroughfare three large ribs, so that you have a mass of coal intended to be worked only toward the close of the operations, separating the panel from the others. Meanwhile, as the workings passed down from the outcrop to deeper parts of the coal field it became necessary to leave a larger and larger mass on the first working, so that it is now common to work away only one-third part of the coal at first, leaving two-thirds in the pillars to be worked afterwards. When they get down to the neighborhood of the North Sea, and intend to work out beneath it, pillars of unusually large size are left, in some cases 40 yards square, and in the Monkwearmouth Colliery, at a depth of 300 fathoms, pillars of even greater dimensions. In the Whithaven Collieries a very remarkable difference is observable between what is done now for working in the most economical way and what used to be done: then pillars used to be 10, 12, or 15 yards square, now they are 20 yards square, with openings of 5 yards breadth. In working the iron ores of Middlesborough, these bords may be frequently of 4 or 5 yards in width. In some cases, where there is any difficulty about the roof, they must be narrower; these are crossed by headways somewhat narrower, leaving the pillars 20 by 6 yards.

The division of the whole era into these panels renders it possible to introduce the pillar working soon after the commencement of the narrow working; and then it becomes a question how far the use of safety-lamps and of open lights is consistent in the same division of the colliery. We shall find that, while the pillars are being got, we are subject to extremely heavy falls from the roof, and also to large volumes of gas being liberated, therefore it would be exceedingly insecure for the working there to go on without the use of safety-lamps being rigidly enforced. It is different in working the whole coal; there, in most cases, open lights may be used, in connection with a due system of ventilation, etc. Where both open lights and safety-lamps are employed in the same district, the workings should never be nearer together than three pillars, and due precautions should be taken to prevent any one with an open light passing into the safety-lamp district. When there are several seams of coal, one above another, it becomes a question which would better be worked first, for it is found that, where they are within a moderate distance of each other, the working in one seam affects the others; sometimes the working in the upper would be prejudicial to those below, sometimes it seems that no harm is done. There is a very good paper by Sir George Elliot in the Transactions of the Northern Institute, which treats on this subject. As a general rule it is supposed to be better that the upper seam should be worked, and the ground allowed to settle, before the lower seam is opened. The pillars will be removed by the assistance of packwalling, or the stuff which falls from the roof built up into walls in certain places, and by the aid of suitable timbering, and much will depend upon the quickness and skill of the men employed. In some cases it may be necessary to begin to remove the pillars at once; sometimes as much as half is left. In the Mostyn Collieries there are 4 yards pillars and 4 yards openings. This may be the case where it is desirable to remove at once the sum total of the coal which it is desired to take out, and then give up the work altogether.—*London Mining Journal.*

COAL MINES OF THE WESTERN COAST OF THE UNITED STATES.

Mr. W. A. Goodyear, M. E., of San Francisco, has nearly ready for publication a book on the Western Coal Mines of the Pacific Coast, and has addressed to those interested in this subject the following circular, which we cheerfully reproduce, in the hope that it may aid in securing the early publication of a much-needed work from a very competent hand. We have known Mr. Goodyear intimately since his graduation at the Sheffield Scientific School, at Yale, in 1863, when he went to California, where he has since resided in the practice of his profession. He has made the study of the coals of that coast a specialty, and has directed the explorations of the Mt. Diablo Mines. His duties for some years in connection with the geological survey of the State of California, gave him a wide field of observation. Mr. Goodyear is certainly well qualified for the work he has undertaken, and his well known fidelity and caution will entitle his statements to great weight. His circular is as follows: B. S.

SAN FRANCISCO, CAL., March 30, 1877.

DEAR SIR:—After an experience of nine or ten years of more intimate practica-acquaintance with the coal mines of California, Oregon, and Washington Terrli tory than has fallen to the lot of any other mining engineer, I now propose to publish a book to be entitled "The Coal Mines of the Western Coast of the United States."

The aim of this book will be to give a clear and full description of the coal fields of this coast, and of the mines themselves as they exist to-day, together with statistics of production, information concerning the relative value for steam purposes of the various coals which come to the San Francisco market, and other cognate matters of interest not only to geologists and mining engineers, but also to all who are connected with the business of mining and selling coal.

The book will be an octavo volume of about 175 pages, handsomely printed on good paper, and well bound in cloth.

The manuscript is nearly ready for the printer, and the book will be promptly forthcoming, if it shall appear that there is a sufficient demand for such a work to justify the cost of its publication; but not otherwise.

In order to test this question, I take the liberty of addressing you this circular, with the request that, in case you would like such a book, you will be good enough upon receipt of this to at once fill out the blanks in the accompanying form of subscription, and return it to me, stating therein the number of copies which you will take, or for which you will be responsible, together with the exact address to which you desire to have them sent.

The price of the book will be two and one-half dollars, in gold coin.

Respectfully, your obedient servant,

W. A. GOODYEAR, Mining Engineer.

CHEMICAL EXAMINATION OF TURNERITE. M. F. Pisani finds in this mineral:

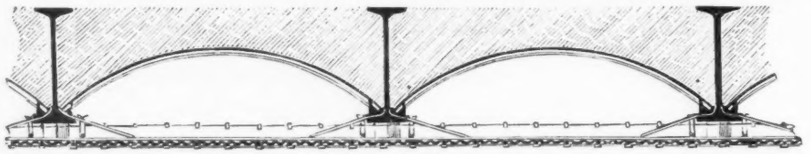
Phosphoric acid	28·4
Oxides of cerium and lanthanum	68·0—96·4

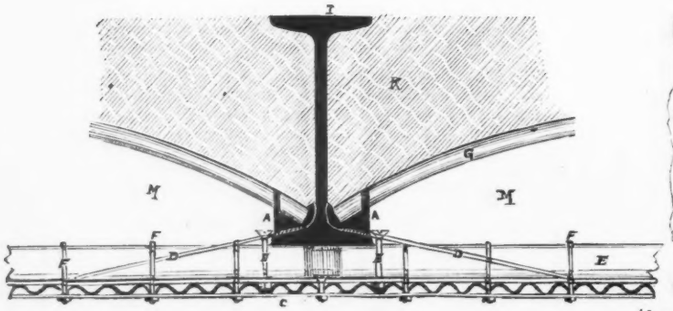
—*Chemical News.*

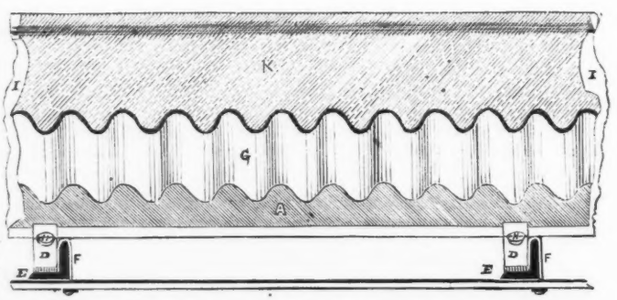
FIRE-PROOF IRON ARCHES AND SHUTTERS.

Manufactured by Messrs. George Dwight, Jr. & Co., of Springfield, Mass.

The first and most important part of construction in any building to be made fire-proof is the floors. For many years the method tried in this country and in England has been to use rolled iron beams, called I beams, from their shape, placing them from 3 to 4 feet apart, and turning brick arches between them, resting on the flanges of these beams. Previous to the Chicago fire it had been noticed by many interested that such floors, although common, had, after all, not met the requirements; they were heavy, and when fire came always failed. The reason was obvious; iron beams, when heated, will expand; the brick arches were necessarily so shallow that a slight movement only on the part of the beam was sufficient to take away the key of the arch, and it would come down. Several devices had been tried to overcome this difficulty, and among them the corrugated iron arch, shown in the accompanying figures, had been slowly gaining favor.







The Chicago fire came, and, as is well known, every building in its path was swept down, with the exception of four, which were provided with these floors (and they were the only ones that had them). The floors of these buildings all stood perfect. The architect, however, was desirous of having the principal ceilings flat, and consequently the floor adopted was the patent combination arch and lath, which accomplishes this end, and also adds immensely to the strength and fire-resisting power of the floor. An examination of the engravings will show the character of this floor: K is concrete; G is a corrugated iron arch; I is a rolled I beam, and A a cast iron shoe or socket beam; W an air space between the lath and arch; D a bar iron clamp passing under A; H a bolt fastening D to E; E the angle iron furring for lath; B is a washer to keep E in place; F are hook bolts for fastening the lath L to the lining, while Q represents the plaster. This lath has gained a wonderful reputation in the short time it has been used.

Messrs. George Dwight, Jr. & Co. manufacture also the Springfield shutter, The shutter is of three thicknesses of corrugated iron, two sheets with corrugations perpendicularly and the middle sheet with the corrugations horizontally, giving a combination which has become known as the bevelled corrugation, the whole inclosed within a channel frame making two air chambers, and a remarkably stiff yet light door or shutter. Some, 5,000 pairs of these shutters were hung in Boston after the fire.

PETROLEUM NOTES.

	February. 28 days.	March. 31 days.
Stock on hand at the wells. Bbls. of 42 gal. each	151,389	153,631
Production for the month " " "	741,412	853,337
Daily production " " "	26,479	27,527
Producing wells " " "	6,441	6,666
Drilling wells " " "	403	395
Stock in iron tks., pipe L. & Refs " " "	2,709,247	2,646,423
Total stock " " "	2,860,636	2,800,054
Total shipments " " "	484,904	913,919

—*Petroleum Reporter.*

The new petroleum field recently discovered in McKean County, Pa., borders on the counties of Allegheny and Cattaraugus in New York, and lies northeast of the great original oil territory. Within the past sixteen months not less than $10,000,000 have been invested within a circuit of twenty miles. In the valley of Tunungwant creek, a tributary of the Allegheny, about two miles broad, over four hundred wells have been opened and are yielding a rich supply of oil. Land that two years ago would have been dear at any price, now sells at $1,000 an acre. Within a distance of four miles three flourishing towns have sprung into existence, and the town of Bradford, formerly consisting of a lumberman's tavern and a few scattered farmhouses, now has 3,500 inhabitants. A peculiarity of the wells is that none of them are what is called large producing, the average being ten barrels per day. The operators claim that this is an advantage. They argue that, the territory being large and the wells small, the danger of exhaustion is much less than it is in the lower territory, where the oil areas are small and the wells large producers. There are three pipe lines connecting the wells with the Erie Railroad at Olean, thirteen miles distant.

In the New York Assembly, on the 18th inst., a bill was passed confirming a lease made with certain Indians of the Seneca nation, for laying an oil pipe through the Allegheny reservation for the conveyance of crude petroleum from the new oil regions in Pennsylvania to Buffalo, where the Erie Canal, the Erie Railroad, New York Central, and Grand Trunk Road would all be competitors for the carrying of the oil to New York. As the case stands now, the Standard Oil Company, in which Vanderbilt is a heavy stockholder, has an arrangement with the Erie Road, and the Buffalo, New York and Philadelphia Road, by which the business of oil carrying is entirely in their hands, and the prices are kept at the highest point.

The Louisville *Courier-Journal* expresses the belief that Kentucky will control the petroleum trade of the United States within eighteen months, and says new and rich oil fields are found in the region comprised within the Cumberland Valley, in the counties of Madison, Pulaski, Lincoln, Wayne, Casey, Russel, Adair, Metcalf, Barren, Monroe, Cumberland, and Chester. A thousand farms in this region have been leased by a New York company within the past six months.

The Toronto *Monetary Times* says: Developing appears to be quite the rage now, both at Petrolia and Oil Springs; the cost of putting down being only about one quarter what it used to be. The time occupied formerly was between one and three months; it now takes between four and ten days, and a well 480 feet deep has been drilled in three and a half days.

The Sacramento *Record-Union* says: The Cesapi Oil Company, of San Buenaventura, Cal., undertook to sink a shaft a short distance, so as to get into solid ground preparatory to boring, but at the depth of a few feet the workmen have been driven out of the shaft by a large flow of fine green oil. As soon as an engine can be got upon the ground the well will be pumped and boring operations commenced. The hills are covered with prospectors, employed by capitalists, who are locating every foot of Government land supposed to be in the range of the oil. The deepest well yet sunk in the green oil belt is only down about 150 feet.

The Titusville *Herald* has the following: The East Titusville gravel bed well has, since its recent strike, averaged 18 barrels per day. The oil is of excellent quality, being 36 gravity. The grounds are daily visited by hundreds of people, who continue to wonder at what may be termed an oleaginous phenomenon. Four leases have been granted on the farm, and four wells will be commenced with the view of drilling to the sand rock. The increase in oil production which was looked for during the month of March was not fully realized. This was partly owing to a suspension of drilling on the part of those most interested in maintaining values.

Fifteen hundred coopers, employed by the Standard Oil Company, Cleveland, Ohio, struck on the 19th inst. against a reduction of 10 per cent in their wages.

MINING NEWS.

Staff Correspondence of the Engineering and Mining Journal.

ARIZONA.

The new mill of the Hackberry Company, at Mohave, is en route for that camp, and will be immediately set up.

In Bradshaw district a correspondent of the *Miner* reports considerable activity, both among prospectors and miners. The Gretna Mine is employing 40 men in and around the mine and are breaking some rich silver ore. The company have commenced the erection of a mill.

The Silver Glance Mining Company has now on hand a large quantity of coal and everything requisite for a large run of its smelting works.

The Peck Mine, which was reported to have been sold for $350,000 gold, is still in the hands of its original owners, the sale having fallen through. New machinery is on the way to this mine, and extensive preparations are being made to increase its productive capacity. The March product was $42,297.64. The company recently made a rich strike in the north tunnel. The Greenwood mill is crushing 25 tons of ore per day from the McCrackin Mine, the average of which is about $40 per ton.

In the Humbug District, the Tiptop Mine has 275 tons of ore on the dump. The company have a shaft 100 feet, drift 40 feet, and a tunnel 110 feet, which will strike the lead in 10 feet more. The ledge is three feet wide, and the claim 6,000 feet long. The Pearl Mine is down with 20 tons of ore raised. The Swilling Mine is down 20 feet, with a three-foot ledge of rich ore. The Cricket has a 30-foot drift on ore that assays high. The Willow Claim looks well. The Cottonwood has 10 to 20 inches of good ore. Hidden Treasure is 6 to 14 inches wide. The Eddy is one foot wide and carries rich ore.

COLORADO.

A new discovery of telluride ore has been made. The location is fully 100 miles away from the Boulder Co. belt, and almost on a direct line from that district to Lake City in San Juan, where tellurium has also been found. At present the discoverer is maintaining silence in regard to his "find."

The Elk Mountain District, west of the Upper Arkansas, is already showing some good results in return for the slight amount of prospecting done last year. Explorers are already in the mountains for the season, and report some new discoveries. The district is both a gold and silver one, and is likely to turn out well.

The New York & San Juan Mining Company have decided to erect concentration works of ten tons capacity this season at their mine in Mineral City.—*La Plata Miner.*

Organized attempts will be made this season to operate the San Miguel placers in Southwestern Colorado. The valley of this stream has been found by prospecting to be auriferous for many miles of its length, and there are reports of ground discovered last fall which is said to be unusually rich. Some capital and a great deal of energy will be expended in the valley this summer.

The stamp mill yield from the Central City gold mines is now averaging steadily over $100,000 per month and is increasing. The production of smelting ore (in which is included tailings, lead ores, and concentrated pyrites) is ranging at about $70,000 per month, and seems likely to equal the mill product by the close of the year. A notable change in the condition of mining in Gilpin Co. is the increased amount of base metal (lead and copper) being taken out. The Boston & Colorado Co. are now paying $2 per unit for copper.

The Rabbit Ear mines, on the divide between Middle and North Parks, are to receive considerable attention this summer; and it is also expected that the gold production from the Hann's Peak District will amount to a good-sized figure. On account of some valuable copper ore discoveries made in the extreme northwestern corner of the State last fall, and the extension of the placer discoveries around Hann's Peak and on the White River, somewhat of an excitement has already begun in and beyond the North Park. The agricultural settlements on the Bear River and the proximity of the Union Pacific Railroad, which may be reached very conveniently at Rawlins, renders this part of the State quite easy of access and susceptible of a very rapid development.

A company has just been organized in Denver to work the old placer ground at the mouth of Clear Creek, known as Arrapahoe bar. The company own nearly a mile of territory on the stream, and propose to open it carefully and upon a large scale. The ground is well known to be auriferous, but whether rich enough to pay is not yet determined. Individual miners have been making wages there off and on for many years.

The *Fairplay Sentinel* says: "The Malta smelting works are in full blast, and running up to their full capacity—ten tons per day, and plenty of ore on hand. On or about May 1st, the London Mining Company will be in readiness to begin operations on their valuable property in Mosquito."

IDAHO.

Rich gold quartz has again been struck at the Charity Mine, Warren's diggings.

The *Avalanche* reports the following of the Owyhee Mines:

"Operations are progressing most favorably in the Golden Chariot, and all the indications denote the approach to the existence of a belt of mineral wealth unsurpassed in value by any of the rich ore bodies hitherto brought to light in this section of the country. A connection has been made with the winze between the 6th and 7th levels which gives an unbroken ore body all along, and much of the rock in sight is worth not less than $50 to the ton. Stoping has commenced under very favorable auspices. The 13th level has been driven south nearly 260 feet. A hard bar of rock has been encountered, being of the same complexion as that which existed on all the levels immediately north of the Linkton ore chute. The vein is strong and well defined, and everything wears a most hopeful look in the lower levels. The company's mill has been thoroughly repaired, and the necessary materials having arrived, crushing will commence in a few weeks or as soon as the roads will admit of the hauling of quartz from the mine.

Affairs at the Empire seem to be more "mixed" than ever. The mine is worked by a few men, and it is reported that they are taking out some fabulously rich rock. Charles Terrill, who returned from San Francisco two weeks ago vested with authority to act as superintendent, was confronted on his arrival at the mine by the party whom he had left in charge of it, and ordered off the premises with weapons. Terrill immediately returned to San Francisco, to consult, we suppose, with the owners of the mine upon the new phase of the situation. The result of his mission has not yet transpired. Meanwhile the jumping process has been renewed, and there are all sorts of rumors afloat as to what has been done and what is liable to come out of this curious condition of affairs pertaining to the status of the ownership of the mine. It is reported that the Terrill party left the mine in bad shape for operations after they made their rich strike in December last, and the party succeeding them, thinking there was some design in this, seem determined to hold on and make the best of it.

"The operations going on in the vicinity of the Poorman, which have resulted in remarkable developments recently, are drawing fresh attention to that mine and its prospects.

"We have reports of a remarkably rich strike in the Idlewild, a mine which was also abandoned a few months ago as incapable of being profitably worked. This also is in the immediate vicinity of the Poorman.

"There is a small force employed at the Leviathan, and work is going on day and night. The tunnel is in over 400 feet, and is now within 120 feet of the shaft. The owners of the mine are confident that they will make a favorable strike soon.

"The Belle Peck is turning out plenty of rich rock, and that mine bids fair to have an unusually prosperous season. The bullion yield the coming summer promises to be larger than at any time previous.

"In the Henrietta Mine, the Wagontown District, some rich rock has recently been encountered and the ledge is constantly growing better. There are several tons of good ore there awaiting crushing, and if the mine could be worked on a large scale the yield of treasure would be immense."

The *Statesman* says of the Boise County hydraulic mines: At Placerville the miners are all busy, and the pipes are running in every direction day and night. All the claims are running at Centerville, and have been for more than a week. At Idaho City the heavy ditches are running full heads of water, and every mine is working full complements of hands both night and day. The late March storms made a good depth of snow on the mountains, and with the rains which have followed, it is evident that there will be an average run of water this season, and, of course, an average production of gold. The Gold Hill Company is working seventy-five men, and crush from 40 to 45 tons every twenty-four hours; the mine is yielding as well as it ever has. The Eisler Company have struck the vein on the Iowa ledge, and are getting some very good rock. The Kimble & Walker mill, eight miles above Idaho City, is running, with good returns from their mine.

MONTANA.

The Moreland mill at Pony has started up on ore from the Strawberry Mine. The mine has considerable on the dump and in sight in the mine.

The Burlington Mill at Butte is running successfully on ore from the mine, and claims to be saving 85 per cent. The Burlington ore is comparatively free from base metal.

The *Northwest* reports as follows regarding Butte district: Four mills are now steadily running, the Davis, Centennial, Clark, and Burlington, and also two arastras, and all with a good supply of ore. The La Plata has reached a depth of 160 feet on its vein, and will not stop short of 200 feet. Developments on the Lexington are being prosecuted vigorously, the ten-stamp mill belonging to the mine being kept fully supplied from shafts and levels alone, no stoping being done. The Walker Bros. mine is on its second 100 feet, and showing finely.

The Montana Concentration Works, at Jefferson (dry process), are reported as running successfully now, concentrating from 10 to 12 tons of ore per day, and with a fair supply on hand.

The mines in and around Butte are turning out about $15,000 per week, keeping four quartz mills steadily running.

A 190-ounce nugget of gold, valued at $3,600, was recently washed out at Cattle City.

NEVADA.

The annual meeting of the Sutro Tunnel Company was held in San Francisco on the 1st inst. The total progress of the Tunnel up to that date was 16,443 feet. It was estimated that the distance to be run to reach the Savage workings would be about 3,000 feet, and this distance will be completed by the 1st of January, 1878. For the past two weeks the tunnel has passed through stringers of quartz giving low assays. On the 6th inst. the whole face of the drift was of solid quartz, 5,750 feet east of the Savage Mine shaft. The quarz resembles that of the Comstock in its crystalline character, and it is said its assays average $34 per ton.

The total length of the tunnel, on the 11th inst., was 16,547 feet. The face of the header changed to ledge porphyry, with streaks of quartz and clay. The material is easily excavated, but requires careful management and good substantial timbering.

From an extended description of this enterprise, in the *Gold Hill News*, we extract the following, as showing the advantages which will be gained on completion of the tunnel:

By means of lateral drifts run from it to connect with the mines north and south, the water from the entire lode to the level of the tunnel might easily be drained into it, and from below that level pumps could be employed to raise it to far more effective advantage than can be done at present. The downward flow of the surface water could be utilized as a motive power to drive the pumps raising the water from below the tunnel level. Thus, in the matter of drainage, the Sutro Tunnel would prove of the greatest importance and advantage, an advantage which every mining company would be very willing to utilize and pay well for. In the matter of ventilation also, the tunnel would doubtless prove of great assistance, especially in case the air current should assume the "down-cast" order and pass through the tunnel, thus drawing down the pure mountain air into the mines, instead of the superheated and less-healthful atmosphere of Carson valley.

The 1,650-foot level of the Consolidated Virginia and California mines corresponds very nearly with the Sutro Tunnel level, and the ore is now being raised from that point through the C. and C. shaft. The double cages deliver their loads of ore from the 1,650-foot level to the surface in 40 seconds, running at a slow rate of speed, and in active and lively ore extraction it is calculated that the trip can be made regularly in about 30 seconds. The preference in this case is altogether on the side of hoisting to the surface and delivering the ore where it can be milled to the best advantage. Raising the ore from below that level can also be done to better advantage by means of steam works hoisting the ore directly to the surface. In raising the great volume of water now being contended with in sinking the C. and C. shaft deeper, the immense advantage of the Sutro Tunnel as a drainage adit is too palpable not to be fully appreciated.

In the Savage mine, which is the objective point toward which the tunnel is being driven to its intersection with the Comstock, the shaft has attained a depth of over 2,200 feet, or about 500 feet below the level of the tunnel. The Hale & Norcross shaft, next south, has attained a similar depth, the lowest working levels of these mines being 2,200 feet below the surface. At this lower level prospecting and development work was being actively carried forward, with encouraging results, until about a year ago, when a huge flow of water was tapped to the eastward, which, in a very short time flooded and filled both mines nearly up to the 1,700-foot level, or to the level of the Sutro Tunnel. More powerful pumping machinery had to be erected, and, since then, the water has been reduced to about 50 feet below the 1,900-foot level. The drift which connects the two mines has been cleaned out and repaired, giving free and perfect ventilation to both mines at that depth, and as soon as the water is reduced sufficiently, the 2,200-foot level will be reopened, and mining development proceeded with as before the great flow of water was encountered.

Benefits which mines of this character would derive from the tunnel are plainly evident. The cost of running the tunnel is about $1,000 per day; rate of progress about 90 feet per week; a bonus is given to the miners for all advancement made over a specified number of feet per week—$1,000 was distributed to the men as bonus on February account. The average number employed is 24 on each 3-hour shifts.

The Julia Consolidated and Gould & Currey have each levied a $1.00 assessment, both delinquent on May 1st.

The exports of quicksilver from San Francisco during April amounted to 4,312 flasks, which sold for 43½ cents per pound.

The Eureka *Sentinel* reports the recent discovery of a large ore body in the Eureka Consolidated outside of the ground covered by the Cole Injunction.

NEW MEXICO.

The new Bremen Mill at Silver City is partially running, and will be fully under way next week.

Seventeen tons of pig copper were shipped from Silver City during the last two weeks of March. The Clifton mines are reported as yielding from 7 to 10 tons of metal weekly, and are being developed with considerable energy. The leasers are contemplating the introduction of Chinese labor in the mine.

In Northern New Mexico at the Cimarron mines preparations are progressing for the season's work in the placer districts. An additional amount of water is to be brought in, and the yield will probably show a considerable gain over the figures of last year. Nothing has been heard of late regarding the company said to have been organized on the placer grounds of the Ortiz Land Grant.

NOTES.

TATAMAGOUCHE (N. S.) COPPER MINE.—A new copper mine has been opened at this place from which 10 or 12 tons has been shipped to Swansea for testing.—*Toronto Monetary Times.*

THE MISSOURI LEAD MINES.—The *Granby Miner* says that the product of mineral at Webb City will average 150,000 pounds per week. Operations at the Teague Creek mines in Webster County will soon be resumed. A shaft will be sunk through the bed-rock 200 feet deep if necessary.

ROYAL LAND COMPANY'S NARROW GAUGE R.R., OF VA.—The Potomac, Fredericksburg and Piedmont road, now owned by the Royal Land Company, has been formally opened from Fredericksburg, Va., due west, to Orange, thirty-nine miles. An extension from Fredericksburg southeast to some point on Wicomico River, in

Northumberland County, is talked of, and the five counties on the line have agreed to donate right of way and $30,000 each as soon as trains commence running.

ANOTHER NEW METAL.—This metal has been named Lavœsium by its discoverer, M. Prat, in honor of Lavoisier. In color, it resembles silver, it is fusible and malleable. Its crystals are colorless, and its distinctive characteristics, according to M. Prat, are: its silver color, the nature of its spectrum, the solubility of its oxide in ammonia, the peculiar color of its combinations with the ferro- cyanide of potassium and with sulphureted hydrogen. With the spectroscope, the metal gives twenty-three lines, several of which coincide with those of copper, whence M. Prat conjectures that copper may contain the new metal.—*Medical Examiner.*

THE WAGES ACCOUNT FOR MARCH of certain mines on the Comstock Lode were as follows: Consolidated Virginia, $38,375.50; California, $60,197.50; C. and C. joint shaft, $10,425.25; Justice, $60,000; Ophir, $24,525.63; Best & Belcher, $4,000; Gould & Curry, $15,000; Mexican, $2,076; Union Consolidated, $2,665; Utah, $3,788.25; Overman, $9,000. The Savage, Hale and Norcross, Chollar-Potosi and Chollar-Norcross-Savage Combination Shaft Companies' pay-roll for the month was for the first named $14,948.27 the second $7,625, and the third and fourth, $26,000. Total amount for the four companies, $48,573.27. The total amount paid out for wages by the fourteen companies named above is $278,626.40. The wages of the mill employees are not included in this statement.

THE MESNARD, L. S., COPPER MINE.—The *Mining Gazette* of the 12th inst. says: This mine is now free from water and a shaft is being sunk down from the second level, showing at times a strong lode at the point that is being worked. The intention of the present management is to work the mine on a plan that suggests the speediest way of proving it up, at least so far as the Pewabic lode is concerned. If this deposit in depth turns out, as it is reasonable to expect it will, the Mesnard is in an excellent position to realize in good time from its stamp rock. A few hundred feet of track would put its shaft houses in connection with the tram-way to the Pewabic stamps, which dressing mill probably has ample room to accommodate the wants of the mine.

LONDON PRICES FOR MINERALS.—R. R. Kelly & Co.'s quotations of minerals are as follows:

"LONDON, April 6, 1877.—China Clay, 11/ to 20/ f.o.b. Cornwall; Phosphates of Lime, ordinary, 60 per cent., 1/; 90 per cent., 1/ 4d to 1/ 5d per unit; Bolivian, £6 15/; Canadian, 80 per cent., 1/ 4d per unit; Estremadura, 1/ to 1/ 3d; Curacoa Guano, £6 2/ 6d U.K.. and £6 5/ to £7, Continent, 70 per cent.; Chrome Ores, £6 to £8; Copper Ores, 12/ 6d to 15/ the unit; Iron Ores, Hæmatite, British, 15/ to 28/ 6d at the mines; Spanish, quoted nominally at 17/ to 26/ at British ports; Algerian, 55 per cent., 26/; Clay Ironstone, 17/ to 19/ nom.; Oolitic 7/ to 10/ 6d; Manganese Ores, 70 per cent., 100/ to 110/; Pyrites, cupreous, 4¼d; non-cupreous, 6¾d the unit, nom. Antimony Ore, £13 to £15; Barytes Sulphate, £3 5/ to £3."

NEW USES FOR ALUMINIUM.—In a paper on the uses of aluminium, Dr. R. Biedermann states that aluminium bronze is used in this country for making the large preserving pans used by wholesale confectioners; and that aluminium is recommended as an alloy in type metal. Lange, in Glashutte (Saxony), employs aluminium in the manufacture of watch springs. The new springs have the advantage over the old in not being subject to rust, in not being magnetic, and in possessing greater hardness and elasticity. An alloy of 100 parts aluminium and five silver can be worked like pure aluminium, but is harder, and takes a beautiful polish. An alloy of five parts aluminium and 100 parts silver is almost as hard as ordinary silver, but has the advantage over it of containing no metal which is of a poisonous nature, or which can effect a discoloration of the silver.—*The Engineer.*

TAXATION OF RAILROAD AND COAL TRANSPORTATION COMPANIES IN PENNSYLVANIA.—The new Pennsylvania tax law provides that every railroad, canal, navigation, street railroad, or other transportation company, including express and sleeping-car companies, shall pay to the State a tax of eight-tenths of one per cent. on its gross receipts, to be paid in two semi-annual installments, the first payment to be made July 1, 1877. Each company must make to the Auditor General a sworn statement semi-annually of such gross earnings, failure to make such return or pay the tax being punishable by a penalty of 10 per cent. on the amount of tax. Where a transportation company has also the right to mine, buy and sell coal, the receipts derived purely from such dealings in coal may be kept separately, but the company shall include in its gross earnings the transportation of such coal over its lines at the same rates as are charged to other parties. Where the property of one company is leased to another the tax may be paid by either the lessee or the lessor corporation according to their agreement, but the State will first look for payment to the corporation actually holding and operating the property. Unpaid taxes and penalties may be collected in the same manner as taxes on any other property.—*Railroad Gazette.*

EXTRAORDINARY STEEL PRODUCT.—Last week the steel-rail mill of the Lackawanna Iron and Coal Company, in the usual eleven turns, on a fifty-pound rail thirty feet long, did the following work, which is considered one of the most extraordinary on record: "Total number rails rolled, 6,173; average per turn, 561; total tonnage during week, 1,377.18; average time rolling each bar during entire week, including all stops during and between turns, 77 seconds; best single-turn rails, 740; best double-turn rails, 1,414; actual rolling time of above, consecutive, 1,414 bars, 23 hours 43 seconds—average 60⅝ seconds per bar; 1,414 bars equal 4 miles and 90 feet of track. Greatest speed accomplished, 109 bars in 97 minutes, a little less than 53¼ seconds per bar; 6,173 rails will lay 17 miles 2,835 feet of track." On the above figures the officers and men of the mill make the following claims and challenge comparison: 1. To have rolled the largest number of rails yet rolled in the world on one rail train in one week. 2. To have made the largest tonnage ever made on equally light rail in one week. 3. To have rolled the largest number of rails yet rolled in twelve hours. 4. The same claim as to twenty-four hours. Taking the above as an average the, company, using both its mills, could roll rails for a double track to Pittsburg, a distance of four hundred and eighty miles, in twenty-seven weeks. This enormous amount of work turned out at No. 2 mill seems all the more when we compare it with that done at No. 1 mill on iron, now having the same capacity as No. 2, when the first Delaware, Lackawanna and Western track was being laid. The distance from Scranton to Great Bend is fifty-two miles, and it took the mill already mentioned nearly six months to roll the rails necessary, which could now be supplied in three weeks.—*Scranton Republican.*

CURIOUS EXPLOSION OF FIRE-DAMP.—At the Mordecai mines near Wilkes-Barre, Pa., the workings have for some time been gradually caving in, and at several points the surface has been affected to a greater or less extent. At the point where the house occupied by Joseph Hamburg, stable boss, stands, the surface has been perceptibly settling, and cracks have opened. One of these opened into the cellar of the house in question to such an extent as to admit of the passage of gas from the mines beneath, and, the cellar being air-tight, confined and held it in a large body. At twelve o'clock on March 31, the wife of Hamburg was engaged preparing dinner, and having occasion to go into the cellar opened the door leading thereto, and the gas immediately filled the room and was ignited at the stove, and in turn ignited that remaining in the cellar. An explosion followed, the force of which blew out one side of the house, and Mrs. Hamburg, standing in the doorway, where the fire had free and immediate advantage, was so terribly burned that she cannot live. A daughter who was in the room was severely but not seriously burned, and will recover. Her injury is about her face and hands. The occurrence was so unlooked for that it could not be guarded against.

THE BUTTE, MONTANA, COPPER MINES.—The *Miner* of the 3d inst. says that there is now in that district awaiting shipment fully 500 tons of copper ore, worth $40 per ton. The mines are generally producing satisfactorily, and the erection of two or three concentrating works will probably be commenced at an early day.

THE ACTON & HARTFORD (QUEBEC) COPPER MINES.—Work on the Acton mine was resumed last summer, and explorations were made at various points both on the surface and underground without any discoveries of ore having been made. In the old stope, between number five and number six shafts, some good ore is still visible, but is not likely to continue any depth. This deposit of ore, occurring in a band of limestone, has been of the most uncertain and irregular character. Several bore-holes have been put down, at one point to a depth of 700 feet; but in no case have any traces of copper ore been brought to the surface. The Hartford mine in Ascot has one shaft sunk to a depth of 500 feet on the dip of the lode, and the ore appears still to increase in quantity and improve in quality. In the ten-fathom level a new mine has been cut into, overlying the old workings about 40 feet, which show a width of 17 feet of solid ore, averaging fully eight per cent. of copper. The shipments of copper precipitate average from seventy to eighty tons a month, carrying 80 per cent. of metallic copper.

TECHNICAL EDUCATION IN JAPAN.—It appears that the Kaisei Gakko is not the only institution in Tokio offering technical education to the rising generation of Japan, the Imperial College of Engineering having about a dozen professors, including two graduates of Scotch universities, two of the Queen's University of Ireland, one an Associate of the Royal School of Mines, and the remainder non-graduates, three of whom, however, mention the colleges from which they did not graduate. The college was established by the Minister of Public Works, with a view to the education of engineers for service in his department. The course extends over six years, of which three years are devoted to theoretical studies and three to practical work. Government cadets are required to serve seven years under Government after completing their six years' course. The standard of examination is at present low, but will be raised hereafter to that of European schools. The course of study leads to no academical or professional degree, but secures the student an appointment as assistant in that branch of the Public Works Department which he has selected. The college appears to be well suited for those to whom the full university course is unnecessary, and is likely to furnish a useful class of thoroughly practical students.—*Mining Journal.*

USE OF ZINC IN COOKING UTENSILS.—The *Journal de Medecine de l'Algerie* publishes an interesting article by M. Jaillard, principal physician of the army, on the dangers which attend the employment of zinc for cooking and other domestic utensils. Appealing to the works of Boutigny Chauffel, Chevalier, etc., he shows that the use for these purposes is attended with great danger, as various condiments, confections, salt solutions, meats, oils, fruits, vegetables, etc., dissolve a certain quantity of zinc from the vessel, which becomes occluded by its contents. M. Jaillard adds that not only is it necessary to banish zinc from such uses, but it is yet more indispensable that its employment should be proscribed when it is alloyed with other metals, as in this case it constitutes a voltaic couple which plays the role of an electro-positive element, and is even more easily attacked and acted upon by the substances mentioned. The salts of zinc are not actual poisons, but they are emetics which produce organic disorders of a very serious character, acting, above all, most seriously on the digestive organs, and it also gradually prevents the proper action of medicines.—*The Engineer.*

GOLD, AND THE GOLD FIELDS OF VICTORIA.—The conclusion of each year affords an opportunity of ascertaining the yield of gold in the colony during the year, and as there is no certain mode of arriving at an idea of the progress of mining, so far as the yields are concerned, at any other period, a careful calculation is made by the *Argus* immediately after the close of every year. The estimate is arrived at by taking the amount of Victorian gold exported in the year, the amount minted and the difference in the amount held by the various banks—who are the gold buyers here—at the commencement and at the close of the year. The Customs returns show that in 1875 Victorian gold was exported to the amount of 709,934 oz. 16 dwts., of the value of £2,841,037, and that in 1876 there was 506,221 oz. 6 dwts. exported, valued at £2,025,957. The return from the Mint sets down 385,852·17 oz. of gold as having been minted in 1875, and 427,878·84 oz. in 1876. The quantity of gold held by the various banks on December 31, 1876, was 71,467 oz., as against 68,306 oz. held at the termination of the previous year. By adding these amounts together—Victorian gold exported, 506,221 oz.; Victorian gold received at Mint, 427,878 oz.; and balance held in banks, 71,467 ozs.—a total of 1,005,566 ozs. is obtained, from which must be deducted 68,306 oz. held by the banks at the termination of the previous year, and therefore included in the export or Mint returns of the present year, leaving 937,260 oz. as the net yield for the year, or a decrease of over 100,000 oz. on 1875, when the returns amounted to about 1,058,823 oz.—*Mining Journal.*

MINING IN DEEP MINES ON THE COMSTOCK LODE.—Every ton of ore extracted from the Con. Virginia and California mines leaves a corresponding vacuum. That space is filled with solid 14 and 16-inch timbers, leaving only a sufficient space between the huge bulkheads for the passage of men and cars. The timbers used for this purpose are cut on the summit of the Sierra Nevada mountains, floated in flumes to the line of the Virginia and Truckee railroad, and then brought by rail to Virginia City. The cost of these timbers at the mines is about $21 per thousand feet. At even these figures it is much cheaper to fill the vacancies occasioned in the mines by the extraction of ores with timber than to employ men to excavate and fill in the same deficiencies with waste rock. Aside from the cheapness and convenience of this method of securing a mine, there is yet another very important feature to be considered. It is a fact that the ore bodies above, below, on every side, are continually working—literally alive. This is not noticeable to any great extent while the miners are at work, for the noise and confusion drowns the sounds, and the continual change of operations hides, in a measure, the signs. But let a man unused to mining tarry for a few hours on the lower levels after the departure of the workmen, and listen to the snapping of the timbers, watch the pebbles break loose and roll down the face of the ore stopes; see huge rocks and slips of clay leave their places and drop from the sides of the drifts, and hear the grinding, crunching sounds that greet his ear on every hand, and the hair will almost rise on his head, and a dread, shrinking feeling of awe and fear take possession of his soul. In the California mine the ore body is worked in sections. In one place where the second section was carried up, and while rising a distance of 50 feet, the length and number of sets of timber being exactly the same, they would not match by three feet or more. On the south line of the Ophir where there had been no extraction of ore, the timbers have sunk until the tops of a set seven feet in length are now just on a level with the car track. The necessity of filling a mine with such material creates a fearful responsibility on the part of both the managers and foremen. These immense blocks and piles of pine wood soon become dry as tinder, and in many places are ground and crushed by the fearful forces at work to a mass of splinters, ready to ignite at the slightest touch. Should a fire occur, aside from the loss of life which might ensue, the lapse of years would not make it safe for a miner to attempt to again work his way into the ruins. In the Consolidated Virginia and California mines nine watchmen are employed with each shift of men, whose sole duties are to follow and watch the men, and see that no candle or light is left carelessly in any portion of the mine. Smoking is strictly prohibited by either employes or visitors, and a man caught breaking any of the regulations in that respect is instantly sent on top. Wherever it is necessary to place a stationary light at a turn in a drift, shallow tin dishes filled with water are used, so that if the light burns down no accident can possibly occur. To the miner eternal vigilance is alone the price of safety.—*Gold Hill News.*

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending April 14, and years from Jan 1st.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	37,938	536,628	57,619	432,047
D. L. & W. RR. Co.	40,513	539,040	35,845	330,574
Penn. Coal Co.	21,221	262,553	13,380	250,039
L. V. RR. Co.	22,466	274,871	27,165	219,165
P. & N. Y. RR. Co.	986	12,604	1,375	6,413
C. RR. of N. J.	37,666	343,554	39,810	229,864
Penn. Canal Co.	4,039	4,039	7,615	10,119
	164,829	1,973,289	182,809	1,478,221
Lehigh Region.				
L. V. RR. Co.	58,687	663,410	71,206	491,982
C. RR. of N. J.	42,925	349,516	29,241	215,259
D. H. & W. B. RR.	426	5,341	531	10,821
	102,038	1,018,267	100,978	718,062
Schuylkill Region.				
P. & R. R. RR. Co.	150,398	1,225,418	116,201	697,827
Shamokin & Lykens Val.	16,752	111,118	8,764	72,486
	167,150	1,336,536	124,965	770,313
Sullivan Region.				
Sul. & Erie RR. Co.	232	3,665	888	16,261
Total	434,249	4,331,757	409,640	2,982,857
Increase	24,609	1,348,900	....	....
Decrease	....	...	....	....

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

Receipts of Coal at Boston, for the week ending April 13, and years from Jan. 1.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
From				
Alexandria and Georgetown	...	1,298	....	4,602
Philadelphia	12,150	80,989	6,385	63,915
Baltimore	2,622	22,084	600	23,202
Other places	2,385	46,708	2,509	48,096
Great Britain	....	707	1,281	3,407
Nova Scotia	....	804	....	199
Total	17,157	152,590	10,775	143,421

Perth Amboy business:

	Tons.
Received for the week	16,509
Shipped for the week	13,320
On hand April 14	144,896

The Exports of Coal from Baltimore for the week ending April 13, were 2,428 tons, and since Jan. 1st, 11,164 tons as against 10,860 tons for the corresponding period of 1876.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 61,045 tons, as compared with the corresponding period in 1876.

Belvidere Delaware RR. report for week ending April 14.	Week	Year. 1877.	Year. 1876.
Coal for shipment at Coal Port (Trenton)	870	1,873	29,810
" " " " South Amboy	17,727	159,642	120,876
Coal for distribution	4,149	138,209	39,621
Coal for Company's use	1,977	93,874	15,140

The production of Bituminous Coal for the week ending April 14, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md..		
Tons of 2,240 lb.	41,558	238,397
Barclay Region, Pa.		
Barclay RR. tons of 2,240 lb.	7,003	106,893
Broad Top Region, Pa.		
Huntingdon and Broad Top RR.	3,711	43,266
*East Broad Top	1,206	13,325
Clearfield Region, Pa.		
*Snoe Shoe	798	13,639
*Tyrone and Clearfield	31,948	361,340
Allegheny Region, Pa.		
*Pennsylvania RR.	3,869	53,901
Pittsburg Region, Pa.		
*West Penn. RR.	3,604	53,312
*Southwest Penn. RR.	624	15,141
*Penn & Westmoreland gas coal, Pa. RR.	7,325	212,718
*Pennsylvania RR.	6,763	104,606

*For the week ending April 7.

The Production of Coke for the week ending April 7.

Tons of 2,000 lb.	Week.	Year.
West Penn. RR.	763	22,315
Southwest Penn. RR.	10,103	169,520
Penn & Westmoreland Region, Penn. RR.	1,259	21,816
Pittsburg, Penn. RR.	1,858	39,886
Total.	13,983	253,537

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 20, 1877.

Anthracite.

The week under review has been an uneventful one in the anthracite coal trade; there has not been even a combination meeting to break its monotony. Upon the whole, however, considerable business has been done, the Philadelphia and Reading Coal & Iron Company somewhat monopolizing the market at prices which, though satisfactory to itself, cause uneasiness to the other companies. Among other sales to be noted is one of 10,000 tons of coal to the city at $3.86 per ton stored away, deliveries to extend over a year. As there will be, in some instances, very heavy charges for cartage, this is considered an exceedingly low figure. This contract is supposed to be backed by the Reading Company, although awarded to a dealer.

The anthracite trade will again have to meet in bituminous coal a strong competition, as the prices at which this latter is being offered brings it to the front once more for manufacturing purposes. Fuller particulars will be found under the appropriate heading.

The Delaware, Lackawanna & Western Railroad Company announces its 143d auction sale, to take place on the 25th inst., at which time 75,000 tons of coal will be sold.

The combination has resolved itself into a matter of hope with a few and one of utter disbelief with a larger number; the actions of some who proposed to be of its number very clearly indicate what is now generally believed, that nothing is to come of the late efforts. The Reading Company, in its attempts to procure business, discredits the assumption that it has any idea of accepting such an arrangement, and Mr. Gowen, in his remarks on the troubles with the Brotherhood of Locomotive Engineers, intimates in very plain terms his lack of confidence in some of the gentlemen who are proposed as his associates in the combination. We make the following extracts from his remarks reported in the Philadelphia *Ledger*:

"Shortly after the attack made upon the Central Railroad of New Jersey, we had confidential but authentic information that our company was to be the next victim, and we accordingly took measures to defend ourselves. . . . It is well known that the coal trade is suffering severely from over-production. If the product going to market over the Reading Railroad could be stopped and kept from market for three or four months, the business of mining and transporting coal from the other regions would be enormously profitable in the interim, and entirely at the expense of the many thousands of suffering workmen of the Schuylkill region who might be thrown into enforced idleness on account of Mr. Arthur's desire to wave his hand.

"It is only six weeks since an attempt, backed by money from other coal fields, was made to create a strike in the Schuylkill region. A regular series of meetings was announced, speakers were promised $50 a night, cash, for their services as orators, all the notorious organizers of the old labor unions were at work, but the good, plain common sense of the workingmen themselves asserted itself, and, the dread of the Molly Maguirism being removed, the scheme had to be abandoned. When it is considered that four hundred engineers owing allegiance to the Brotherhood, and willing to remain idle for $60 a month, could stop the entire traffic of the Reading Railroad, and throw into idleness at least fifty thousand men, whose families might starve unless they had work, it will readily be seen how dangerous would be the position of any railroad company whose locomotive engineers were under the control of Mr. Arthur. Sixty dollars a month for 400 engineers is but $24,000 a month, and five months' idleness would cost the Brotherhood but $120,000. Suppose other coal regions would contribute $120,000 for such a wave of Mr. Arthur's hand as would stop the Reading Railroad for five months. It would be safe to say that five millions of dollars is the lowest sum at which the profits to be gained by such regions from the stoppage can be estimated. It is true that a population of two or three hundred thousand people, dependent upon the traffic of the road, would be seriously inconvenienced, and that many thousands would be reduced to starvation, but the four hundred engineers would receive their pay from the Brotherhood monthly, and if their places could not be supplied, all other workmen would have to look out for themselves. I only mention this to show how dangerous to all the true interests of the country it is to have the operations of a great railroad and the business interests of several populous counties dependent upon the wave of the hand of Mr. Arthur."

We reported several weeks ago the fruitless efforts of those interested in other coal fields to bring about a strike in the Schuylkill region. From the above we infer that similar attempts have been made to influence the strike among the company's engineers. If such be the case, it would seem the source of trouble has been traced to within a limited area, and if it should fall upon one or two of the companies to be directly represented in the combination, we are not surprised that Mr. Gowen should insist upon an "adequate security" for good faith.

The production of anthracite coal is steadily on the increase. For the week ending the 14th inst. it was 434,249 tons as against 388,453 for the previous week, and 409,640 tons for the corresponding week of 1876. The total production from January 1 was 4,331,757 tons, as compared with 2 582,857 tons for the like period of last year, showing an increase this year of 1,348,900 tons. With the coal consumed at the mines, the production is at the rate of 25,000,000 per annum, a very satisfactory quantity when we consider the depression that exists in nearly all branches of trade. The Reading Company's production is now at the rate of about 8,000,000 tons per annum, and from January 1 shows an increase of over 75 per cent. as compared with the corresponding period of 1876.

Bituminous.

The prices for this article are experiencing a degree of demoralization perhaps never before realized in the trade. The only important sale that we can confirm is one of about 20,000 tons of Cumberland coal for delivery from Georgetown and Baltimore to the Old Colony Steamship Co. There are rumors of further sales, some particulars of which we hope to give in our next. The immediate cause of prices being unsettled is a war between the Baltimore & Ohio R.R. Co. and the Chesapeake & Ohio Canal Co. We have heard of sales at less than $2.90 f.o.b. at Baltimore, and still lower quotations at Georgetown. The true figures are as yet a little indefinite. The origin of this war was an effort on the part of the railroad company to take trade from the canal by offering secret concessions in freight to the mining companies. When this was discovered, President Gorman, of the Canal Co., addressed a note to President Garrett, of the Railroad Company, with the view of fixing upon a just division of the trade, and the establishment of rates of freight that would make the business of transporting the coal a profitable one to both, while meeting the competition from other coals. This communication was ignored by the Baltimore & Ohio Company. President Gorman then advised that the business of the canal be maintained at all hazards, and asked power to meet the competition, which appears to have been granted, for in an address at Cumberland, on the 17th inst., he is reported to have said: "So help me Heaven! I will throw open the canal at 10c. per ton before I will yield in this matter."

Assuming that he should reduce tolls to 20c. per ton and that the cost of mining under a large business is not over 80c. per ton, we get the following cost per ton f.o.b. at Georgetown:

Cost of mining	80c. per ton.
Freights on C.& P.R.R., average distance about 26 miles	52 "
Tolls on Canal	20 "
Freight to boatmen	80 "
Transfer at Georgetown	19 "
Total	$2.51

This figure of cost of coal, delivered at tide-water, would carry consternation to even a large portion of the producers of anthracite coal.

The Baltimore & Ohio R.R. Co. is doing but little to encourage the general industries of the State of Maryland, Baltimore enjoying the chief benefits, while the Chesapeake & Ohio Canal distributes its benefits through a large section of country. As the State is largely interested in both undertakings, the question is assuming considerable political importance, and much sympathy from the citizens along the line of the canal, and particularly in Allegheny County, is being given the Canal Company. Already the lines are being laid for the election of a legislature in sympathy with the canal, that some legislative action may be taken at the next session of that body to be held during the coming winter.

The action of the Baltimore & Ohio Railroad Company points clearly to the necessity of another outlet for coal from the Cumberland region to the canal, and the schemes to build the lines which we have frequently mentioned are receiving much attention.

There is more coal being produced in both the Clearfield and Cumberland regions than there was a year ago.

Gas Coals.—We do not learn of any important business in gas coals. The prices which are now being quoted are certainly low enough, but the gas companies are not satisfied that bottom has been reached. Philadelphia and Baltimore prices have been reduced to $4 50 per ton f.o.b. The railroad companies have to blame themselves for the lack of confidence the consumers have in them, and the desire there is to delay purchases. For several years past, after the establishment of what was pronounced bottom prices, and after considerable business had been done on this basis, reductions were made later in the season to less important buyers. This year the large companies are mostly well supplied, and show an inclination to let the smaller companies open prices, hoping thereby to procure real bottom prices themselves.

The steamer *Alhambra*, from Cow Bay, N. S., arrived here on the 16th inst., with 900 tons of Block-

House coal, being the first arrival of the season of Provincial coal.

The *American Manufacturer* of the 19th inst., says:

"The miners at Dravo & Co.'s, Connellsville Gas, Coke and Coal Company, at Connellsville, and H. Clay Frick's, at Broadford; also all along the Mount Pleasant and Fayette county branches, are on a strike. They were getting twenty-five cents per wagon, and demand thirty-three cents. They are opposed to company stores, and want their pay in cash, instead of part store orders, as heretofore. The strike is confined to mines where they use all the coal for coking. The striking miners to the number of 300 assembled at Broadford one day last week to discuss the situation. We understand that the number on strike is 800 to 1,000."

New York and Philadelphia.

Wholesale Prices of Anthracite Coal f. o. b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Rondout	2 90	2 90	2 90	2 95	3 35	3 25
Wilkesbarre at Port Johnston	2 90	2 90	2 90	2 95	3 35	3 00
Plymouth, R. A.	....	....	2 90	2 95	3 45	3 10
Susque: Coal Co., (S. H. Brown & Co.,) At Amboy	2 75	2 75	2 75	2 80	3 25	2 85
Kingston at Hoboken	2 90	2 90	2 90	3 00	3 30	3 15
Pittston at Newburgh:						
A. S. Swords	2 80	2 80	2 85	2 85	3 30	3 25
Penn. Coal Co	3 10	3 10	3 10	3 20	3 60	3 25
Wyoming at Perth Amboy	....	3 00	3 00	3 10	3 65	3 35
Lehigh Coals.						
Old Company at port Johnston	3 75	....	3 25	3 25	3 65	3 25
Old Company's Room Run "	3 75	....	3 25	3 25	3 65	3 25
Sugar Loaf, Hobok & Amb."	3 75	....	3 25	3 25	3 65	3 35
Lehigh at Perth Amboy	3 75	....	3 25	3 25	3 65	3 35
Honey Brook Lehigh	3 75	....	3 25	3 25	3 65	3 25
Beaver Meadow at South Amboy	3 75	....	3 25	3 25	3 65	3 25
Mount Pleasant at Hoboken	3 75	....	3 15	3 15	3 50	3 30
Cross Creek at Elizabethport	3 75	....	3 25	3 25	3 75	3 25
Schuylkill Coals at Port Richmond, Philadelphia.						
Schuylkill white ash	2 75	2 75	2 75	2 65	3 00	2 75
Schuylkill red ash	....	....	....	2 85	3 10	2 75
Lorberry	....	....	3 50	3 50	3 50	3 00
Lykens Valley	....	....	3 75	3 75	3 75	3 00

‡Boats towed by the D. & H. Co. at its expense to and from New York Harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	.35c.
" " Elizabethport & Port Johnston to N. Y	.35c.
" " South Amboy to New York	.35c.

Freight by the boats of the companies from Hoboken, Rondout, Port Johnston, Weehawken, South Amboy and Perth Amboy to New York City and vicinity 50c.

Pittston coal at New York delivered by Penn. Coal Co.'s boats 60c. per ton additional.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 50	$5 50
" " at S. Amboy.	5 00	5 50
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt	4 50	5 65
Despard, West Va	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 86
Fairmount, West Va., " "	4 40	5 70
Newburg Orrel, Md. " "	4 50	6 00
Cannelton Cannel, West Va	....	10 00
" Splint " at Richmond.	6 00	7 00
" Gas Coal at Richmond	4 14	5 65
Peytona Cannel W. Va. at Richmond	....	10 00

Foreign Gas Coals.

	Sterling.	Am. cur'cy
Newcastle, at Newcastle-on-Tyne	8/6@10/6	5 50@6 00
Liverpool House Orrel, at Liverpool	25/	13 00
Ince Hall Cannel "	35/6	18 06
" Gas Cannel "	25/6	10@10 50
Scotch Gas Cannel, at Glasgow, nominal,	25/ Gold.	7 50
Block House at Cow Bay, N. S.	1 75	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
International mines at Sydney	1 75	4 50
Pictou, Vale mines, at Pictou	2 25	....

Retail Prices in New York.

Anthracite.

Per 2000 lbs.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$3 90	$4 20	$3 90
Lackawanna coal, in yard	3 50	4 00	3 90
Wilkes-Barre, delivered	5 00	5 30	4 60
Lehigh and Locust Mountain, del'd	5 50	5 50	5 00
Schuylkill Red Ash, del'd	5 25	5 50	4 75

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " "	18 00
American " " "	11 00
Cannelton Block, or splint, " "	10 00
American Orrel " "	11@14
Red Bank Cannel " "	9 00
Cumberland " "	7 00

Baltimore. April 18, 1877.

Hard White Ash, Reading, Susq. Coal Co.'s, Cameron and other White Ash, Shamokin, Bear Valley, &c.

Wholesale Prices.

AFLOAT BY CARGO.

Lump and Steamboat	$3 40	Stove	$3 90
Broken	3 25	Chestnut	3 40
Egg	3 30		

In cars in dealers' yards or on switch, 15c. per ton additional.

Lykens Valley Red Ash, afloat.

Broken	$3 98	Broken	$4 15
Egg	4 13	Egg	4 30
Stove	4 13	Stove	4 30
Chestnut	3 63	Chestnut	3 80

From wharf or yard to the trade, 75c. per ton additional.

Bituminous.

George's Creek, f. o. b. at Locust Point	$3 50 to $3 60		
Clearfield, " Canton	3 30 to 3 40		

Boston. April 14, 1877.

Coal is somewhat unsettled, under the influence of the conflicting reports as to the combination. The stock here is steadily increasing, and so is the output at the mines. The chief drawback now to an effective combination seems to be the fact that the New Jersey Central is in the hands of a receiver, who can give no security for the keeping of a contract of this kind. Freights are now quoted as follows: Philadelphia, $1 40 @1 45; Baltimore, $1 50@1 55; Alexandria and Georgetown, $1 50@1 60; New York, $1 20@1 25. We quote Boston wholesale price as follows:

Anthracite, broken	4 50@4 75	Cannel, English	16 00
do egg	4 50@4 75	do Buckeye	10 00
do stove	5 00@5 25	Lingan	4 75@5 00
Cumberland	5 75	Pictou	5 50
Clearfield	5 25	Penn	6 25
Westmoreland	5 50	Youghiogheny	5 00@6 00
Caledonia	4 50@4 75		

— Commercial Bulletin.

Buffalo. April 17, 1877.

Specially reported by Lee & Loomis.

	Lump.	Run of Mine.	Nut.	Slack.
Connellsville Coke	$5 00	....	.....	....
Brookfield Coal	4 15	....	.....	....
Briar Hill	4 00	....	2 85	....
Youghiogeny	4 00	3 15	.....	....
Monterey	3 50	....	.....	2 40
Catfish		....	.....	
Stoneboro	....	....	2 75	2 40
Sterling Cannel	5 00	broken 4 75	4 50 nut & slack	....
Reynoldsville	3 50	3 15	2 65	2 40
Cameron	....	3 15	.....	2 40

In New York city funds.

Chicago, Ill. April 16, 1877.

Specially reported by Messrs. Reno & Little.

Lackawanna Stove	$8 00	Erie and Brier Hill	$6 00
" Chestnut	8 00	Wilmington and Ill.	3 50@4 25
" Grate and Egg.	7 50	Blossburgh	7 00

Cincinnati, O. April 17, 1877.

Specially reported by the Consolidated Coal and Mining Co.

	Aflоat. Per bush.	Aflоat. per ton 2,000 lb.	Delivered. Per bush.	Delivered. per ton 2 000 lb.
Youghiogheny lump	7c.	$1 94	10c.	....
" nut	5¼c.	1 53	9c.	....
" slack	4½c.	1 25	8c.	....
Camden, W. Va.	5¼c.	1 53	9c.	....
Peytona Cannel	16c.	4 57	20c.	....
Connellsville coke	7c.	3 60	10c.	....
Youghiogheny coke	5c.	2 64	8c.	....
Crushed coke	....	....	10c.	....

Anthracite, Wilkes-Barre or Lehigh by car load $6 70
" " " delivered 8 00

Cleveland, O. April 16, 1877.

Specially reported by Messrs. Lambie & Bates.

Per ton of 2000 lbs. f. o. b. vessels.

WHOLESALE.

Briar Hill (Church Hill)	3 50
" " No. 2 Grades	3 35@3 40
Straitsville Lower Vein	2 80
Hocking Valley	2 80
Massillon	2 85
Mineral Ridge (Cambria Mine)	2 85
Tuscarawas Valley	2 30
Columbiana	2 30
Nut coal, various grades	2 20@2 50
Screenings, " "	1 35@1 75
Youghiogheny gas coals	3 75@3 85

The following are the prices established by the Coal Exchange until further notice:

RETAIL TRADE.

	1 to 10 tons.	10 tons upw'd.
Brier Hill lump	$4 25	$4 00
" " nut	3 75	3 50
Massillon and Mineral Ridge lump	4 00	3 75
" " " " nut	3 75	3 50
Straitsville Lower Vein, Hocking & Shawnee, l'p.	3 60	3 35
" " " " nut	3 40	3 15
Del Carbo lump	3 75	3 50
" nut	3 50	3 25
Rich Hill lump	3 50	3 35
" " nut	3 25	3 00
Columbiana, lump	3 25	3 00
" nut	2 75	2 50
Lacka'a., Wilkesbarre and Pittston egg and grate,	7 00	6 75
" " " " stove	7 50	7 25
" " " " chestnut	7 00	7 25

Lehigh $1 25 per ton higher.

All sales to be strictly cash with order or C. O. D.

Hamilton, Ont. April 14, 1877.

Specially reported by V. Barnard.

Prices as quoted below give the present state of our market for coals that are in demand:

Grate	$5 95	Briar Hill screened	6 00
Egg	5 75	" " unscreened	5 50
Stove	6 50	Blossburgh	6 00
Nut	6 50		

Indianapolis, Ind. April 14, 1877.

Specially reported by Messrs. Cobb & Branham.

Wholesale on board cars, and retail delivered to consumers.

BITUMINOUS.

White River, per ton	$ 2 50	Peytona Cannel, per ton.	$ 5 75
Brazil Block, "	2 25	Indiana Cannel	4 50
Highland, grate, "	2 00	Hocking Valley	4 25
Block coal, nut, per car.	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas Cake. per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre).

Broken	$7 60	Nut	$6 70
Egg	7 60	Stove	6 70

Lehigh Anthracite.

Broken	$7 60	Nut	$7 30
Egg	7 60	Stove	7 70

Retail, per bushel, delivered.

Sand Creek	13c.	Block Nut, steam	8c.
White River	13	" Slack, "	0
Brazil Block	13	Virginia Cannel	27
Highland Grate	11	Youghiogheny	16
Block Nut, domestic use.	11	Blossburg	26
Highland Nut, " "	11	Piedmont	26
" " steam	8		

GAS COKE (measured.)

Crushed	14c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$7 50 per ton.
Lehigh, retail	8 50 per ton.

Louisville, Ky. April 16, 1877.

Specially reported by Messrs. Byrnes & Speed.

WHOLESALE.

Pittsburg	7c. per bush.	Pine Hill	9c. per bush.
Raymond City	7c. "	Kentucky	8½c. "

RETAIL.

Pittsburg	12c. per bush.	Pine Hill	11c. per bush.
Raymond City	11c. "	Kentucky	10c. "
Indiana Cannel	17c. "	Honeywell Can'l.	19c. "
City Make Coke	10c. "	Anthracite $8 50 to $9 per ton.	

Milwaukee, Wis. April 16, 1877.

Specially reported by Messrs. R. P. Elmore & Co.

Retail price per ton of 2,000 lb.

Lehigh Lump	$8 00	Briar Hill, select	$7 00
Lehigh Prepared	9 00	Blossburgh	7 00
Lackawanna (all sizes)	8 00	Cannel	6 00
Pittston	8 00	Pittsburgh	6 50
Scranton	8 00	Oak Hill	4 00
		Steam coal	6 00

Montreal. April 16, 1877.

Specially reported by Messrs. Robert C. Adams & Co.

Wholesale per ton of 2,240 lb.

Scotch Steam	$4 50	Cape Breton Steam	$3 75
Pictou	4 25	Newcastle Smiths	6 50

Anthracite at retail, per 2,000 lb. delivered.

Egg	$6 50	Chestnut	$7 00
Stove	7 00		

New Orleans, La. April 16, 1877.

Specially reported by Messrs. C. A. Miltenberger & Co.

On hand April 1st, 92 boats and 4 barges; consumption during March, 23 boats and 8 barges of Pittsburg coal; arrivals during March, 26 boats and 2 barges of Pittsburg coal. The coal market continues depressed, caused by competition in trade, with an anxiety to sell. Stock ample for limited demand. A more active trade is anticipated the present month, in the requirements of sugar planters for next year's crop. We quote:

PITTSBURG COAL.

At wholesale (by boat load)	35c. per bbl.
To steamboats	45c. "
" manufactories	50c. "
" families	75c. "
In hhds. (for shipment)	$6 50 per hhd.

ANTHRACITE COAL.

At wholesale (per ton)	$6 00 to 7 00 per ton.
" retail	11 00 "

VIRGINIA CANNEL COAL.

At retail	$1 25 per bbl.

ST. BERNARD (KY.) COAL.

To steamboats	40c. "
" families	70c. "

Philadelphia, Pa. April 19, 1877.

Specially reported.

There is no change to note in the trade. The scarcity of vessels continues, and freights are ruling to $1 55(@$1 60 to Boston, and $1 25 to the Sound ports. Philadelphia ship owners have lost heavily for a few weeks past, and unfortunately the losses experienced at sea were accompanied by loss of life in many instances.

The strike of the locomotive engineers on the Reading railroad has not so far been seriously felt. The company has succeeded in running the trains as well as could possibly be expected. The difficulty in obtaining competent hands is beginning, however, to be felt at this end, where the distribution of coal is delayed. The most sanguine advocates of a combination are now giving it up.

Richmond, Va. April 19, 1877.

Specially reported by S. H. Hawes, Dealer in Coal.

Per ton of 2,240 lb., f. o. b.

Kanawha Cannel	$9 00	New River Bituminous	$4 25
Coalburg Splint	5 70	Clover Hill Coal	3 50
Lewiston "	5 70	James River Bitum	3 25
Kanawha Gas Coal	4 90	" " Carbonite	5 00

Sandusky, O. April 18, 1877.

Specially reported by C. E. Black, Agt. Con. Coal & Mg. Co.

We quote coal on cars at Sandusky, as follows:

Per ton of 2,000 lbs.

Anthracite.

	Grate.	Egg.	Stove.	Chestnut.
Wilkes-Barre	$6 00	$6 10	$6 60	$6 60
Lackawanna	6 00	6 10	6 60	6 60
Lehigh	6 75	6 85	7 35	7 35

Bituminous.

Massillon	$2 90	Straitsville	$2 65
Del Carbo	2 65	Shawnee	2 65
Hocking Valley	2 65	Blossburg	5 25

For retail delivery, from 50c. to 75c. per ton additional to above prices. Prices f. o. b. vessel for Lake shipments, 10c. to 15c. per ton above prices on cars.

San Francisco, Cal.

From the *Commercial Herald* April 12, 1877.

COAL—Imports from January 1st to April 1st :

	Tons.		Tons.
Anthracite	5,406	Mt. Diablo, 2 mos.	10,051
Australian	16,590	Vancouver Island	22,128
Coos Bay	9.354	Rocky Mountain	43
Cumberland	4,222	Seattle	29,620
English	17,623	Bellingham Bay	1,850

Arrivals during the current month have been liberal, including cargoes of Australian, Scotch, English, in addition to very full supplies of Seattle and other coast descriptions. Wellington is steadily growing in public favor for all household purposes by reason of its cleanliness. The market is sadly demoralized for all kinds, and it is with exceeding difficulty that cargo sales can be effected, either on the spot or to arrive, and this depressed state of trade has led commission merchants to offer their cargoes for sale in lots to suit purchasers. This very objectionable mode of doing business is prejudicial to the market in general. Our quotations must be looked upon as entirely nominal. The Nanaimo mines are producing freely, supplying the Pacific Mail Company liberally. The Seattle Company have yet a running contract with the Pacific Railroad. Bellingham Bay, Coos Bay, Black Diamond, and Mt. Diablo coals arrive freely, all selling at low prices from the wharf, say for cargo lots $7 50@8. Vancouver Island coals, $8@9 by the cargo; Scotch and English steam, $7 50@8; Australian cargoes to arrive, $9@9 25.

Our monthly receipts from Mt. Diablo mines for a period of years are as follows :

Months.	1873.	1874.	1875.	1876.	1877.
January	13.907	15.145	14.181	8,653	5.303
February	10.447	13.589	14.344	9.047	4.874
March	12,178	14.258	12.355	8,876	4.883
Totals	36.532	42,992	40,880	26,576	15,060

The following gives the comparative imports and receipts for March, 1876-7.

Foreign.	1876. Tons.	1877. Tons.	Increase. Tons.	Decrease. Tons.
Australian	....	1,117	1,117	....
English	2,181	4,502	2.321	...
Vancouver	11,479	7.253	....	4,226
Eastern.				
Anthracite	2,322	2,877	555	....
Cumberland	...	98	98	....
Domestic.				
Mount Diablo	8,876	4,883	....	3.993
Coos Bay	3,430	4,577	1,147	....
Bellingham Bay	3,125	.. ..	....	3,125
Seattle	12,065	14,020	1.955	....
Rocky Mountain	33	....	....	33
Totals	43.511	39,327	7,193	11.377
Previously since Jan. 1st	75,500	77,443	27.276	25,333
Totals since Jan. 1st.	119,011	116,770	34.469	36,710

St. Louis, Mo.

April 16, 1877.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.	per ton.		
Lackawanna	$9 00@10 00	Schuykill	9 00@10 00
Wilkes-Barre	9 00@10 00	Lehigh	10 00@10 50
BITUMINOUS.			
Blossburg	9 00	Big Muddy	3 00
Pittsburg	4 50	Illinois Coals	2 50@3 00
Indiana Block	4 00	Connellsville Coke.	6 50

Toledo, Ohio.

April 17, 1877.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote coal as follows on cars at Toledo for rail shipment:

Ton of 2.000 lb.

Straitsville lump	$2 75	Hocking Valley nut	2 35
" nut	2 35	Massillon lump	3 00
Shawnee lump	2 75	Cumberland	5 50
" nut	2 35	Blossburg	5 50
Hocking Valley lump	2 75		

	Grate.	Egg.	Stove.	Chestnut.
Pittston	$6 00	$6 10	$6 60	$6 35
Wilkes-Barre	6 00	6 10	6 60	6 35
Lackawanna	6.00	6 10	6 60	6 35
Lehigh	6 75	6 85	7 35	7 10

For retail delivery, from 50c to $1 per ton in addition to above prices is charged.

Prices soft coal f. o. b. vessel for Lake shipments will be from 15 to 20c. per ton more than prices on cars.

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To † Newark, N J. (117 miles) via Central Railroad of New Jersey	36	1 22	1 80	1 71	1 92
† Mauch Chunk, Pa., via Central Railroad of N. J.	14	...	58	49	70
† Phillipsburg, N. J., (46 miles)	70	56	1 14	1 05	1 26
Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 15c. add.	1 00	86	1 44	1 35	1 56
High Bridge, N. J.	1 80	1 60	2 58	2 19	2 30
Elizabeth, Cranford, Westfield & Elizabethport, for consumption.	1 80	1 60	2 18	2 19	2 30
Jersey City, N. J., (121 miles) and New York via L. V. RR.	1 59	1 22	2 01	1 92	2. 15

From *Mauch Chunk* to *New York* (121 miles), (towing limits, and Jersey City‡ via Lehigh Valley RR. $1 12

From *Mauch Chunk* to *Philadelphia* (93 m) via L. V. and L. and S. RR. and North Penn. RR. 1 25

From *Mauch Chunk* to *Philadelphia* (92 m) via L. V. and Perkiomen RR. 1 40

For way points between *Mauch Chunk* and *Phillipsburg* on the New Jersey Railroads 1 00

From *Phillipsburg, N. J.*, to *Hoboken* (84 m) for shipment via Delaware, Lackawanna & Western RR., Morris and Essex Division 65

From *Phillipsburg, N. J.*, to *Newark* (75 m) via Delaware, Lackawanna & Western RR. 66

** Rates on line coal from Hazleton are 10c. per ton above these figures.

† The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 00 per ton.

‡ On coal received by canal at Jersey City, a charge additional to the freight, of twenty cents per ton, will be made for transferring it from boat to boat, and thirty cents per ton for placing the same on the wharves and reshipping.

The distances in the above table are computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *Upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

Freights

Representing the latest actual charters up to April 19. Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me.	....	....	....	....
Albany	....	....	....	....
Alexandria	85	....	....	....
Annapolis, Md.	65	....	....	....
Bangor, Me.	....	1 75	....	1.15-1.25
Bath, Me.	....	1 50	....	1.15-1.25
Baltimore	60@80	....	....	....
Boston, Mass.	150@175	1 50	160@170	1.20-1.25
Bridgeport, Ct.	....	1 35	1 40	50
Bristol, R. I.	....	....	....	80
Beverly, Mass.	1 55	....	....	1 30
Cambridgeport, Mass.	1 50	....	....	1 25§
Charleston, S. C.	1 55	....	....	....
Danversport, Mass.	1 55	....	....	....
Fall River	1 25	1 35	1 45	80
Gloucester	....	....	....	....
Greenport, N. Y.	....	.. .	....	....
Hartford, Conn.	....	....	....	....
Hoboken	....	....	1 25	35
Hudson	....	....	....	....
Jersey City	....	....	1 25	35
Lynn, Mass.	165@190	....	....	1 30†
Middletown	....	....	....	90
Medford, Mass.	2 00	....	....	....
Newark	....	....	....	....
New Bedford	125@130	....	1 50	85
Newburyport	....	1 65	....	1 40
New Haven	....	1 35	1 40	50
New London	....	1 35	1 45	65@70
Newport	1 30	....	....	80
New York	85@90	1 15	....	35
Norfolk	70	....	....	75
Norwalk	....	....	....	50
Norwich	....	....	....	....
Pawtucket	....	....	....	90
Philadelphia	....	....	....	....
Portland	125@160	1 45	....	1 25
Portsmouth, N. H.	125@160	1 65	....	1 40
Providence	125	1 35	1 45	80
Poughkeepsie, N. Y.	....	....	....	....
Richmond, Va	70	....	....	....
Rockport, Mass	....	....	....	....
Salem, Mass.	1 60	1 50	....	1 25
Somerset, Mass.	....	....	....	85
Stamford	....	....	....	60
Stonington	....	....	....	75
St. Johns, N. B.	....	....	....	....
Troy	....	....	....	....
Taunton	....	....	....	....
West Chester, N. Y.	....	....	....	....
Washington	75@80	....	....	....
Weymouth	....	....	....	....
Wilmington, Del.	....	....	....	....
Wareham	....	1 50	....	....
Yonkers, N. Y.	....	.. .	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c per bridge extra.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, April 20, 1877.

For some time an improving demand for iron has been noticed at some of the Southern and Western markets. This had a tendency to hold prices firm with an upward inclination for a time ; but many makers, realizing the position of the market availed themselves of this better feeling to dispose of their stocks, the result of which was to overstock the market, and prices now have a somewhat lower inclination, although a a better business is being done. The Eastern markets show no improvement, on the contrary, the position of the trade is being made worse and worse by overproduction, and there are indications of additional furnaces going into blast. Unless some curtailment of make be inaugurated, the bottom of prices can only be measured by the financial necessities of the producers, which in some cases are even now very great. We only note sales of 2,800 tons Thomas No. 2 foundry iron on private terms. W quote No. 1 foundry at $19@$20 ; No. 2 foundry, $18@$19 ; and forge, $17@$18.

Scotch Pig.—The arrivals and stocks are only moderate, while sales are small at the following quotations, which might be shaded : Coltness, $27 ; Glengarnock, $26 ; and Eglinton, $24.75.

Rails.—A sale of 4,000 tons of steel rails for delivery from Baltimore is reported—terms kept private, We quote iron rails at mills at $33@$37 and steel at $47@$50.

Old Rails.—There is no business reported. We quote at $19.

Scrap is very quiet. We quote No. 1 wrought at $25@$26.

Baltimore, Md.

April 18. 1877.

Specially reported by Messrs. R. C. HOFFMAN & Co.

Below we give present prices of iron, at which moderate sales are made :

Baltimore Charcoal	$29@31	Mottled and White	$16@17 00
Virginia Charcoal	28@32	CharcoalC. B. Blooms	58@60 00
Anthracite No. 1	21@22	" Billits.	63@65 00
" 2	20@21	Refined Blooms	45@47 00
Anthracite No. 3	19@20		

Boston.

April 14, 1877.

Pig is dull and easy, with no reliance placed on the reports from New York of 50c. better prices. During the week sales are reported there of 800 tons Thomas, Nos. 1 and 2 X, at $19 and $20, and 1,250 tons Jagger iron in about equal quantities of white and mottled, No. 1, and gray forge, on terms not made public, but reported to be very low. We quote $23 50@25 00 for No. 1, $23 00 for N . 2, and $22 00@23 00 for gray forge. Scotch pig is dull. We quote $27 00@30 00 for store lots. Bar is dull, quoting $47 00@48 00 for refined, and $38 00@39 00 for common. Nails are in light demand, and prices have been reduced at the West.—*Commercial Bulletin.*

Chattanooga, Tenn.

April 18, 1877.

Specially reported by J. F. JAMES, dealer in pig iron, ores, etc.

The general position of this market has not varied much since my last report. The demand for all grades is certainly equal to the supply ; indeed, within the past few days a couple of our Southern charcoal furnaces have accepted offers ahead for their thirty days' production. Rising Fawn Furnace has resumed operations, but for what length of time it is impossible to say. It is rumored the owners of the furnace and the bondholders will take possession of the property on the 1st of July, and run it upon a legitimate and business-like basis. Our local papers here give credence to the report that some heavy sales have been effected for pig metal, amounting to thousands of tons, within the past two weeks, which, in the face of the continued depression amongst the rail mill and manufactured iron men, needs some very strong confirmation. These exaggerations as to the doings of the iron trade South has a very bad effect North and West, and brings ridicule to the entire section from those who are well posted as to the condition of the trade in general. The feeling certainly prevails that bottom has at last been reached, and with a steady increase in general business, and the anticipated advance in pig iron and nails, all standard brands of pig iron will reach a fair and remunerative producing price, instead of, as at the present, being sold at actual, and in some instances under, cost. From all reliable sources, I can ascertain an aggregate of shipments during the past week from this section of some 450 tons. I quote on the usual terms f. o. c. here :

Tenn., Ala. and Ga. Charcoal, No. 1 Foundry	$19 00@20 00		
Tenn., Ala. and Ga. Charcoal, No. 2 Foundry	18 00@19 00		
Tenn., Ala. and Ga. Charcoal, Gray Forge	16 00@17 00		
Tenn., Ala. and Ga. Coke, No. 1 Foundry	20 00@21 00		
Tenn., Ala. and Ga. Coke, No. 2 Foundry	18 00@19 00		
Tenn., Ala. and Ga. Coke, Gray Forge	15 00@16 00		
Charcoal or Coke, white and mottled	14 00		
Tenn., Ala. and Ga. Cold Blast (car wheel)	22 00@28 00		
Old rails	22 00@28 00	Wrought scrap,	
Old car wheels	18 00@19 00	No. 2	12 00
Wrought scrap,		Cast scrap	10 00
No. 1	17 00	Muck bar	32 00@33 00

Iron Ores.

Red Hematite (about 55 per cent. metallic iron) f. o. c. at mines	1 25
Brown Hematite (about 55 per cent. metallic iron)	1 75

Cincinnati, O.

April 16, 1877.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

CHARCOAL.		
Hanging Rock No. 1 Foundry	$25 00@	....—4 mos
" " 2 "	24 00@	....—4 mos
" Soft Silver Gray	22 00@23 00	—4 mos
" Mill	21 00@22 00	—4 mos
Tennessee, No. 1 Foundry	23 50@24 00	—4 mos
" " 2 "	22 50@23 00	—4 mos
" Mill,	21 00@22 00	—4 mos
STONE COAL.		
Ohio, No. 1 Foundry	22 50@23 00	—4 mos
" " 2 "	21 50@22 00	—4 mos
" Soft Silver Gray	21 00@21 50	—4 mos
" Mill	20 50@21 00	—4 mos
COKE.		
Ohio & W. Va. No. 1 Foundry	25 00@	....—4 mos
" " " 2 "	24 00@	....—4 mos
" " Mill	21 00@22 00	—4 mos
CAR-WHEEL.		
Hanging Rock, C. B	38 00@43 00	—4 mos
Tennessee, "	28 00@32 00	—4 mos
Missouri, "	30 00@33 00	—4 mos
Alabama, "	28 00@32 00	—4 mos
BLOOMS.		
Charcoal	50 00@60 00	—cash.
SCRAP IRON.		
Cast	50c.@1 00	— "
Wrought	1 00@1 40	— "

Cleveland, O.

April 18, 1877.

Specially reported by Messrs. C. E. BINGHAM & Co.

Per gross ton, on four months' time. Subject to change in market Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, L. S. Charcoal	$26 00	Am. S., No. 1, Ch. Val.	24 00
No. 2, " " "	25 00	" " B—1, " "	23 00
No. 1, Anthracite	23 00	" " No. 2, " "	22 00
No. 2, "	22 00	No. 1, Massillon	24 00
No. 1, Bituminous	23 00	B—1, "	23 00
No. 2, "	21 00	No. 2, "	22 00

CAR WHEEL AND MALLEABLE IRON.

No. 3, L. S. Charcoal	26 00	No. 5 & 6, L. S. Charcoal	$27 00
No. 4, " " "	27 00		

BESSEMER IRON.

Nos. 1 & 2, L. S. Char.	$25 00		

FORGE IRON.

No. 1, Gray	$21 00	White and Mottled	$19 00

Louisville, Ky. April 17, 1877.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is quiet and without change in either price or tone. The receipts continue small, but are fully equal to the demand. The usual time, four months, is allowed on the quotations below :

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$24 50@25 50
No. 2 " " "	22 00@23 00
No. 1 Southern Charcoal	21 50@22 00
No. 2 " "	20 50@21 00
No. 1 Hanging Rock, Stonecoal and Coke	23 00@24 00
No. 2 " " " "	21 00@22 00
No. 1 Southern Stonecoal and Coke	21 00@21 50
No. 2 " " " "	20 50@21 00
"American Scotch"	23 00@23 50
Silver Gray	19 00@21 00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neutral	20 00@21 00
No. 1 Stonecoal and Coke, Cold-short and Neutral	20 00@20 50
No. 2 " " " " "	19 00@19 50
No. 1 Missouri and Indiana Red-short	24 00@24 50
White and Mottled, Cold-short and Neutral	16 00@17 00

CAR-WHEEL AND MALLEABLE IRON.

Hanging Rock, and Cold Blast	37 00@40 00
Alabama and Georgia "	28 00@35 00
Kentucky Cold-blast	28 00@40 00

Milwaukee, Wis. April 16, 1877.

Specially reported by Messrs. R. P. ELMORE & Co.

L. S. No. 1 Charcoal	$26 00	L. S. No. 1 Anthracite	$25 00
" " " 2 "	2 500	" " " 2 "	24 00

Montreal. April 10, 1877.

Pig iron is being quoted at prices which will hardly pay cost, letting alone any profit to the sellers. We therefore continue to quote: Pig iron—Gartsherrie, $22 @$22.50; Summerlee and Calder, $21@$21.50 ; Eglinton and Clyde, $19.50@$20; Hematite, $26@$27. Bars —Scotch and Staffordshire, $2@$2.10 ; best, $2.20@ $2.30; Swedes and Norway, $4.75@$5.50; Lowmoor and Bowling, $6@$6.50.—*Monetary Times.*

Philadelphia, Pa.

[Weekly Report of the Philadelphia Iron Market, furnished for THE ENGINEERING AND MINING JOURNAL, by JUSTICE COX, Jr., & Co., Iron Manufacturers, 333 Walnut Street, Philadelphia. Week ending April 19, 1877].

PIG IRON.—There is more demand, but nothing stiffer as to price. Most mills and foundries are fairly busy. We report sales of about 3,000 tons at quotations. We quote No. 1 $20 to $20.50 ; No. 2, $17.50 to $18.50 ; gray forge, $17 to 20 as to quality. We hear reports of two furnaces blowing in at Reading and two on the Lehigh.

MANUFACTURED IRON.—The demand for all sorts of manufactured iron has been quite good, and one or two large contracts for bars and plates are reported. Prices continue low, but if orders continue to come in we will surely see higher prices. We quote bars 2 to 2.4-10 as to quality and brand ; tank, 2¼c. to 7c. per lb. as to quality ; skelp, 2¼c. to 2¼c. per lb.

RAILS.—The demand for steel rails continue good with firm prices. The demand for iron rails is improving, one or two mills having good orders. We quote steel, $49 to $50 ; iron, $36 to $40.

OLD RAILS.—The demand for old rails has been quite good this week. A sale of 2,000 tons is reported at $20. We quote $20 to $21.

SCRAP is in plentiful supply at low prices. We quote wrought $24 to $26 ; cast, $14 to $19.

OLD WHEELS are dull of sale. We quote $19 to $21

Pittsburgh, Pa. April 17, 1877.

Specially reported by A. H. CHILDS.

The metal market is without much animation, its general features remaining about as last reported. The difference between good brands of red short iron and the less desirable brands of weak cold short irons is perhaps more pronounced than ever, and the selling prices of gray forge show a wider variation than for many years, varying all the way from $19 to $22 50 per ton, according to quality, some being hard to sell at the lowest figure, while others are in active demand at or near the highest named. Quotations are :

	4 mos.		4 mos.
No. 1 F'dry	$23 00@24 00	Mottled & White	$17 50@20 00
" 2 "	22 00@23 00	Hot blast C'coal	22 00@28 00
Gray Forge	19 00@22 50	Cold " Western	40 00@45 00

Richmond, Va. April 13, 1877.

Specially reported by ASA SNYDER, Esq.

The old story of dull market still prevails, although holders are stiffer than one week ago in the figures for charcoal pig. Anthracite pig is quite active in small quantities, but at lower quotations.

Virginia Cold Blast Charcoal Pig Iron			$27 to $33
" Warm " " " "			24 to 28
" " " Coke " "	1 X		23 to 24
" " " " "	2 X		21 to 22
" " " " "	3		20 to 21
" Anthracite	1 X		— to —
" "	2 X		— to —
" "	3		— to —

San Francisco, Cal.

From the *Commercial Herald* of April 5, 1877.

San Francisco, Cal.—From the *Commercial Herald* April 12.—Business is exceedingly depressed, the demand light for all description of goods, and quotations more or less nominal. The ship *Craigmullin*, from Liverpool, brought 8,379 bxs. Tin Plate, etc. Sedney Block Tin may be quoted at 17¾@18c. Pig iron is slow of sale. Sales of 1000 pigs Sydney Block Tin, private.

St. Louis, Mo. April 17, 1877.

Specially reported by Messrs SPOONER & COLLINS, Commssiion Agents for all kinds of Iron.

CHARCOAL.

Missouri No. 1 Found'y.	$23@25
" " 2 "	22@23
" Gray Mill	22@23
H. Rock No. 1 Found'y.	25@26
" " 2 "	23½@24
" " Gray Mill	23@24
Tenn. No. 1 Foundry	23½@24
" 2 "	22½@23
" Gray Mill	22½@23

COKE.

Alice H. R. Ex No. 1 F'y.	26 50
" " 2 "	25 50
B, " 1 "	24 50
" 2 "	23 50
Forge	23 50
Chat., Tenn. No. 1 Fd'y.	25 00
" " " 2 "	23 50
" " Forge	22 50
" " White Mtl'd	21 00

STONE COAL.

Missouri No. 1 Fd'ry.	..25@24
" " 2 "	..23@23
" Gray Mill	22@26
" White & Mt'd	21@22

COLD BLAST CHARCOAL FOR CAR WHEELS.

All Numbers

Hanging Rock	35@46
Tennessee	30@33
Kentucky	30@33
Missouri	28@30
Georgia	58@30
Alabama	28@30
Assorted Bar Iron $2 25. rates.	
No. 1 Wrought Scrap 95c. cwt.	
Heavy cast " "	70 "
Light " "	40 "

METALS.

NEW YORK, FRIDAY EVENING, April 20, 1877.

The week under review has been without a feature in the metal market. Business continues, as a rule, very quiet with no indications of an early revival.

Gold Coin.—During the week under review the price of gold has ranged from 105⅞ to 107¼ and closed at 106½.

Bullion.—The price of silver has advanced the past week under higher rates for India exchange in London, but cable advices to-day report the market nominal and weak. The chances appear to be in favor of a reaction to lower figures. The price in London today is 54¾d.,and in this city 118¾@119. Gold bars are quoted at par to ¼ per cent premium.

Copper.—The sales for the week aggregate about 500,000 lb, at 19¼@19½c., closing at 19⅜@19½c. Manufacturers have been purchasing much more freely during the past three weeks, and are reported to be receiving a fair amount of orders for their manufactures. The averages of the auction sale of copper in England this week are cabled at £76 4/ for Wallaroo and Burra Burra £75 3/ 9d. As these figures are about £1 lower than the March sale,they have had a slightly depressing effect here.

Messrs. Vivian, Younger & Bond, of London, under date of April 6, say of copper : Chili bars opened at £71 10/ with a steady market, and a fair business passing. This improvement, however, was speedily lost, and £70 was soon the price, with the same unsettled feeling, and buyers exercised the greatest caution, only taking just sufficient for immediate wants, and altogether the outlook was anything but encouraging, the principal cause of depression being the accumulated Havre stock. To relieve the market of this difficulty a scheme was arranged with the chief consumer in France, by which 6,000 tons of this copper becomes available to supply the wants of the French trade. So far as the removal of this incubus goes, the tendency of the operation should be favorable, but the general terms of the contract, and the fact that the French consumers may be considered as quite out of our market for six months, discourages the dealers here, and will probably make the whole market most uninteresting to speculators. Consumers, however, feel more confidence, and though there is an ample supply of copper available, and holders are not disposed to be extreme in their demands, there is a greater appearance of stability than has been the case for a long while, and it looks as if £70 for Chili bars may now be considered a bottom price, and so far the French contract appears to have settled the immediate future for copper. On the 20th ult. the following sales were made at public auction : Of Wallaroo, 512 tons cakes and ingots sold at an average of £77 0/ 7d for cake, and £77 17/ 10d for ingot, the average of the whole sale being £77 2/ 6d per ton. Of Burra Burra cake, 403 tons sold at an average of £75 7/ 10d per ton. The Swansea ticketings went as follows: 13th ult., 1,663 tons British and foreign ores, average 20¾ per cent. sold at 14/ 1¾d ; Cape ores, 20¾ per cent., realizing 14/ 2⅛d ; and New Quebrada (240 tons, 20⅛ per cent.) 14/ 1⅛d per unit. 3d inst., 1,997 tons ores, 13 9-16 per cent., sold at 13/ 11½d ; Cape ores, 32⅝ per cent., 14/ 3d per unit.

The quantity of Chili bars, ores, and regulus in stock at, and afloat for, Liverpool, Swansea and Havre, and of English and foreign copper in London, is thus estimated in fine copper :

		1877 1st Apr.	1876 1st Apr.	1875 1st Apr.
Stock		28,233	20,363	21,260
Chili produce shipping and afloat per mail advices		8,500	10,300	9,650
Total	Tons	36,733	30,663	30,910
		1877 1st Apr.	1877 1st Mar.	1877 1st Feb.
Stock		28,233	27,983	26,363
Chili produce shipping and afloat per mail advices		8,500	8,500	10,500
Total	Tons	36,733	36,483	36,463
Chili produce, chartered for per cable, received up to date		3,200	5,200	4,500
Australian produce afloat		2,600	3,500	4,700

Tin.—Straits in London is quoted at £69, and in Singapore at $20 per pecul. The business here is only in a small way at the following quotations in gold per pound ; Straits, 16¾c.; L. & F., 16½c.; Refined, 16¾c.; and Banca, 19½@19c. Shipments of Straits to America for the first fortnight of this month was 150 tons.

Messrs. Vivian, Younger & Bond, of London, under date of April 6, say of tin—"The fluctuations have been unimportant during the month, straits has sold at from 72/ down to 71/, and Australian from 70/ 6d. down to 69/ 9d.; English common ingot from 74/ 6d. down to 73/ 6d. The stock shows a further increase, and is now at the highest total yet reached. The monthly deliveries have not been up to the average of last year, owing to some extent to the relative cheapness of Banca and Billiton in Holland. The shipments of Straits for last month are advised as only 120 tons, and it seems as if for the present the available supplies from that quarter will continue moderate. The stock of foreign tin in London and Holland is thus estimated:

	1877 1st Feb.	1877 1st Mar.	1876 1st Apr.
Foreign tin in London	7,865	8,605	6,725
Banca tin in Holland	1,450	1,048	853
" (in company's hands)	449	1,065	1,733
Billiton tin in Holland	930	1,010	900
	10,702	11,728	10,211
Quantity of tin afloat for Europe	4,500	4,200	4,700

Tin Plates.—These are in moderate demand at the following prices in gold per box : Charcoal tins, $6 50@$6 75, and ternes, $5 87½@$6; coke tins, $5 62½ @$5 87½, and ternes, $5 25@$5 50.

Messrs. Robert Crooks & Co., of Liverpool, under date of April 5, say of tin plates: "Demand from all quarters continues miserably small, and the market is now in the worst position it has yet been in, both as regards prices and tone. Should the present depression continue, we may have even lower figures, but in this connection it is worthy of note that even the dearth of orders now prevailing has not squeezed prices in the month for charcoals more than 3d., while in cokes the dip does not exceed 9d. per box. It is generally allowed the margin for reduction now compatible with solvency in the seller for any length of time is very small indeed."

Lead.—We are only reported a sale of 200 tons on private terms. The market is weak and may be nominally quoted at 6¾c.

Spelter and Zinc.—With but very little business doing spelter is quoted at 6¼@6½c. Sheet is without change at 7⅝@7½c.

Antimony is quiet, and quoted at 12½@12⅝c., gold.

Quicksilver is unchanged in price. We quote in London. £7 10/, and San Francisco, 41c.

The San Francisco *Commercial Herald* of April 12 says of Quicksilver: the demand for this article is quite urgent, yet the business suffers under the general trade depression. Price here 41c.; in London, £7 10/ per bottle.

Salt Lake Ore and Metal Market.

Telegraphic advices from Salt Lake City, of a recent date, report the following prices for base bullion and argentiferous lead ores. Prices are firm at these quotations caused by the recent rise and continued firmness in gold. The dullness of the market for pig lead, however, will likely have an unfavorable influence on the market.

Argentiferous Lead (Base Bullion).—$74 per ton for lead. $1.22 per ounce for silver. $20 per ounce for gold. The quotations for silver is based upon the silverontents in the lead of 70 ounce per ton of 2,000 lb.

☞ The *Inter Ocean's* correspondent, under date of the 12th inst., says : The bullion market remains as last quoted, with no sales. Ores are coming down in price, and can be purchased as follows : Bingham, $1 per ounce for silver on a basis of from 20 to 30 per cent. lead. The Cottonwood ores from $1.05 to $1.10 per ounce for silver on a basis of 30 per cent. lead.

The shipments of ore and bullion for the week ending April 7 are as follows : 25 cars bullion to Omaha ; 14 cars to New York ; 9 cars to Pittsburg ; 3 cars to St. Louis ; 3 cars lead ore to Hilliard ; 1 car to Pittsburg ; 3 cars copper ore to Pennsylvania ; 11 cars lead ore to Melrose, Cal. ; total, bullion, 1,072,242 lb. ; lead ore, 316,524 lb. ; copper ore, 64,580 lb.—grand total, 1,452,346 lb.

The mining prospects in the southern part of the Territory are most flattering, and enterprises of some magnitude are being inaugurated in San Francisco district.

The weather has been quite cold the last three days, which will help the snow roads in the mountains, and send the ore forward.

☞ The Old Telegraph Mine of Bingham has just completed the introduction of steam drills which will en-

able them to increase the production of ore without any increase of cost.

There is an accumulation of bullion at some of the smelters' waiting an advance in prices. Ore is more plentiful than ever before, and the furnaces can make money, on better margins, than for the last three years.

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, April 20, 1877.

The coal stocks still hold the leading position on Wall street. Morris & Essex Railroad has been the great feature, having declined within the last ten days over 20 per cent., and since Feburary 10, 31⅞ per cent., or a depreciation of over $4,750,000 on the whole capital stock. Delaware, Lackawana & Western Railroad opened at 55⅛ on the 14th inst., and declined to 42¾ to-day, closing at 44¼, with total sales of 219,340 shares. The total shrinkage in these two stocks during the past thirty days has been over $7,000,000. Delaware & Hudson Canal has followed the downward course in sympathy with the above stocks, opening for the week under review at 44, selling down to 38⅛, and closing at 39, with total sales of 50,090 shares. New Jersey Central Railroad has ranged between 7¾ and 7¼, closing at the latter figure with but light transactions.

There have been several rumors calculated to depress the values of D. L. & W. RR. and M. &E. RR. stocks. It was reported that the D. L. & W. Railroad Company would annul its lease with the M. & E. Railroad Company, and later, that the D. L. & W. Railroad Company contemplated the issue of $10,000,000 of bonds. Both these reports were emphatically contradicted by the officers of the company, but without checking the downward tendency. As there appeared to be no concentrated attack of the bears, it was asked on every side, "what is wrong?" but without bringing any solution. The most likely cause appears to be that holders of the stock believe that no combination can be formed by which the coal companies can receive any permanent benefit, and that it will be with difficulty, if not impossible, to pull through to better times, and with these views are forcing their stock upon the market.

We append a synopsis of the report of the Morris & Essex railroad as made to the State of New Jersey, in accordance with the laws of that State, for the year ending December 31, 1876:

Capital stock	$15,000,000
Funded debt	19,194,000
Total stocks and bonds	$34,194,000

The business of the year was as follows:

Gross earnings from coal		$1,630,661
"	from merchandise	772,884
"	from passengers	848,703
"	from other sources	200,111
Total receipts		$3,452,359
Maintenance of roadway, etc	$662,142	
Repairs to machinery, etc	254,481	
Operating expenses	1,350,973	
Total operating expenses,		2,267,596
Net income		$1,184,763

This represents the sum received by the lessors—the Delaware, Lackawanna and Western Company—over and above the expenses of working the road. The Delaware, Lackawanna and Western pay rental for the same 7 per cent. on bonded debt and stocks, so that its loss on the road is as follows:

Seven per cent. on $15,000,000 stock	$1,050,000
Seven per cent. on $19,194,000 debt	1,343,358
Total rental	$2,393,358
Deduct net income	1,184,763
Deficiency of earnings for 1876 to meet expenses, interests and dividends	1,208,595

Miscellaneous Sales and Quotations.

Sales and quotations of the stocks and bonds dealt in here and at Philadelphia, for the week ending the 20th inst. are given in the following tables. The Philadelphia quotations will have a * affixed.

STOCKS.

	Quotations. Highest.	Lowest.	Closing.	Sales Shares.
American Coal Co	—	—	30	—
*Cambria Iron Co	—	—	57	—
*Pennsylvania Salt Manf'g Co.	—	—	65	—
*Westmoreland Coal Co	—	—	—	—
*Buck Mountain Coal Co	—	—	—	—
Schuylkill Nav. Co	—	—	40*	—
St. Louis, I. M. & S. RR. Co	5¼	5	4⅛	—
Spring Mountain Coal Co	—	—	40	—

BONDS.

D., L. & W. 7s, Convt., 1892	—	—	—	—
" " 2d mtge., 1881	107⅛	—	106¾	5,000
N. J. C., 1st mtge., new	108⅜	105	—	40,000
" " 1st mtge., cons	56⅜	53	—	21,000
" " Convt	51⅜	47	49	41,000
L. & W. B. Coal Co., cons	28½	27	28¼	6,000
Am. Dock & Imp. 7s	45	—	40	10,000
D. & H. C. Co., 1st m., 1884	95⅝	—	95⅜	1,000
" " " " 1891	96⅜	95⅛	96⅛	11,000
" " " " 1877	98	—	96	1,000
" " " " reg.& con.,1894	88⅛	—	87	4,000
St. L. I. M. & S., 1st mtge	95	94	95½	28,000
Ches. & Ohio, 1st mtge	21	—	22⅛	2,000
*L. V. RR., con. mtge., 6s, 1923	93½	—	—	8,000
" " 2d mtge., 7s, 1910	107	—	106⅜	11,000
" " reg. & con., 1898	106¾	—	106	8,000
" " 1st mtge., 6s	—	—	—	—
*P. RR., 1st mtge., 1880	—	—	104⅞	—
" Gen. mtge. reg., 1910	—	—	107	—
" Con. m. 6s. cou.& reg. 1905	—	—	—	—
Pa. gen. M. Coup., 1910	—	—	—	—
*P. & R. RR., 7s, 1893	—	—	—	—
" " con. m.7s. cou.1911	93¼	—	—	10,000
" " Deb. 6s, 1893	—	—	—	—
" " New convt. 7s	—	—	49	—
" " Con. mtge. 7s. reg.	93⅜	93¼	—	3,000
" " 6s. 44-80	—	—	—	—
*P. & R. C. & I. Co. Deb. 7s	55	50	—	23,000
*P.& R.C.& I.Co., Tamaqua T.	55	—	—	1,000
*L. C. & N. Co. 6s. 1884	101⅛	101	101	1,500
" " RR. loan 1897	100	—	100	1,200
" " Con. mtge. 7s	—	—	—	—
" " Convt. gold, 1894	—	—	—	—
" " Gold Loan, 1897	86¾	86	86⅛	5,500
*Schuylkill Nav., 6s. 1897	—	—	—	1
*Pa, and N. Y. Canal, 7s	106	105½	105⅛	7,000
*Pa. Canal Co	—	—	—	—
*Susquehanna Coal Co. 6s	—	—	—	—

Total transactions for the week.....$259,200

Philadelphia Stocks.

PHILADELPHIA, FRIDAY EVENING, April 20, 1877.

The decline in the coal shares on this market still continues and the list, without exception, closes to-day at the lowest point of the week. The transactions aggregate 134,000 shares.

Pennsylvania Railroad.—This stock closes to-day down to 70 per cent. against 74 per cent. a week ago; the sales amount to about 109,000 shares.

The receipts and expenditures of this company for the first quarter of the current year are reported to show a net increase of over two hundred thousand dollars greater than in the corresponding quarter last year.

The company's foundry at Altoona has used more metal in castings during the past three months than in any similar period in its history. At all points on the line of the road evidences of substantial progress are seen.

Reading Railroad.—About 10,000 shares of this stock have changed hands at from 24 to 21¼ per cent., the lower figure being the final price.

The strike of the Brotherhood of Locomotive Engineers has as yet caused but little inconvenience to the company. The Reading division of the brotherhood have authorized the publication of the following proposition to General Manager Wootten: "The insurance circular of the Reading Railroad Company to be withdrawn, the company to pay the engineers the same wages they were receiving when they withdrew from their employ, and promise that there shall be no further reduction of wages. The engineers agree on their part that they, their firemen and all the other old employes will return to work, and there shall be no strike at any time if the above conditions are not broken by the company."

The company have raised the wages of the firemen and engineers who have remained in the company's employment fifteen and twenty-five cents respectively a day. The baggage masters, conductors, and brakemen on the part of the line running to Reading, Pa., have left work.

We note the statement that at Palo Alto there are a large number of loaded coal cars standing waiting for engines and taking up so much room that the tracks are blockaded. This, it is thought, may compel a suspension of mining operations by the 21st inst., throwing thousands of men temporarily out of work.

Lehigh Valley Railroad stock is down to 68½, a decline of 7¼ per cent. for the week. The sales amount to 3,650 shares.

Lehigh Zinc Company.—The annual meeting of this company will be held on the 2d of May.

Catawissa Railroad Company.—The annual meeting of this company will be held on the 7th of May.

Vulcan Mining Company.—This company will hold its annual meeting of the 10th of May.

Barclay Coal Company.—The annual meeting of this company will be held on the 7th of May.

It is said that the Alleghany Valley Railroad Company is considering the question of building an extension of the Sligo Branch, from Sligo, Pa., north by west to Oil City, about 30 miles. This extension would complete a loop line from Red Bank to Oil City, 46 miles long, or 22 miles less than the existing line. The extension would also pass through the center of the Clarion oil field.

Westmoreland Coal Company.—50 shares of this stock were sold at auction during the week at $79 per share.

Susquehanna Canal Company.—We note a recent auction sale of $7,000 of the 6 per cent. bonds of this company at from 36 to 38 per cent.

Copper Stocks.

BOSTON, THURSDAY EVENING, April 19, 1877.

Reported by Wilson W. Fay & Co., Bankers and Brokers Room 7, Travellers Building, 31 State street

The market remains as previously reported, a little fall here and a little rise there, but most of it done without any sale. In fact it is the same old story that we have told so long. Allouez, a single sale at 8, now 6½, best bid. Calumet & Hecla steady at 184 bids. Copper Falls is 2¾ bid for small lots, but even this is not bid publicly. We think there are parties who would like to get some stock if they could do so without being known. Duncan has flattened for some reason unknown to 4½ bids. International no sales, ⅝ bid, a decline of ⅛. Quincy has turned, and is in demand at 39½ against 37 one week ago. In the small coppers there is nothing doing.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, April 20, 1877.

The sales during the week have been less than for the week previous, amounting to 68,600 shares, as against 84,340. A notable feature, however, is an increased business in the Comstock mines, sales aggregating about 25,000 shares, at generally declining prices. The feature in the week in these has been the rapid and unaccountable decline in Overman, the stock touching 10½ on the 10th inst., against over 90 a month ago. Late information from the mine says: "The main east drift on the 1,400 feet level is steadily advancing as fast as the flow of water and the bad ground will permit, and that the general appearance in all parts is quite favorable." Other stocks on the list show no features worthy of note, the business having been limited. Several small and unimportant failures were announced during the week, the result of the bear speculations in Hukill and Seaton noticed in our last.

We condense the following from the *Gold Hill News* of the 11th inst.: The daily yield of the Consolidated Virginia is 350 to 400 tons. It is thought that the bullion yield to date, taken along with the prospects of this mine for the remainder of the month, warrant the assertion that the old rate of dividend of $2 per share will be resumed in May. The connecting drifts and air passages are being enlarged, preparatory to extracting many thousand tons of the lower grade of ores left in that portion of the mine. The California is yielding 400 tons of rich ore per day, keeping the mill steadily running.

The C. & C. shaft is now down 50 feet below the 1,050 feet level, and it is confidently expected that a depth sufficient for the opening of the 1,750 feet level station will be attained by the 1st prox. The flow of water in the bottom of the shaft is still very strong, and keeps the powerful pumps running at the top of their speed to keep it down. The ore yield and bullion product of these mines for the first quarter of the current year is computed as follows:

	Tons Ore.	Bullion.	Average.
Con. Virginia	18,724	$1,304,500	$ 73
California	49,014	4,992,800	100
Totals	67,738	$6,357,300	$ 94

The Ophir mine is yielding 20 tons of ore per day, assaying from $40 to $00 per ton. The flow of water at the bottom of the main incline is gradually abating. The winze sinking near the California line, below the 1,700-feet level is now down 40 feet, the bottom in quartz and ore. The Savage mine is seriously troubled with water. The face of the south drift in the Silver Hill is in very encouraging quartz. Crosscuts No. 1, 2 and 3 in Best and Belcher are in very favorable porphyry. Justice is yielding 400 tons of ore per day, and the mine is looking well in every part. The water in the east drift of the 1,600-feet level of the Bullion Mine flows quite strong and is intensely hot. Working in the drift can only be advanced by the most careful and judicious management.

The Denver *Mining Review* of April 7th, says, "With the developments now made in the Hukill Mine, it is safe to calculate that there is unworked ore above the fourth level that should yield a net profit of $900,000, and which can be taken out within three years," while it further says: "The Hukill presents every evidence of being a fissured vein practically inexhaustable in depth," * * * and that "it is possible to commence and continue a heavy production from it immediately, and under careful and honorable management to draw from it heavy dividends. We believe that such are the intentions of the present management."

The New York *Tribune* of the 17th inst. says: "The Edith Mine, in the State of Virginia, is now in full operation, washing the auriferous gravel by means of powerful hydraulic machinery. As the stock is expected, when placed on the list, to start at not more than $2 per share, its advent is eagerly looked for by the *habitues* of the Mining Board. It is given out that it will commence the payment of regular dividends within three months. The three active shares already on the list which are paying monthly dividends of 1 per cent. on a par value of $10 are the Merrimac, selling at about 0¾; the Hukill at 3¾ to 4½, and the Seaton at something less. The fact seems to be very nearly demonstrated that the shares of good dividend-paying mines in reputable hands will command fair prices and ready cash buyers in this market. A dozen such mines would make the board a success beyond all question."

We glean the following from our exchanges published near the respective mines:

The *Idaho Gold Mine* of Grass Valley Calf, yielded $42,682 in bullion during the month of March, from which a dividend of $7 50 per share was declared on the 10th inst., aggregating $23,250.

The Northern Belle Silver Mine, of Nevada, produced during the month of March $152,164 against $155,600 for the month previous. The usual monthly dividends of $1 per share, equal to $50,000, has been

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

[New York and Philadelphia.]

	Amount of Cap. Stock.	Shares issued.	Date, percentage and amount of last dividend.		Quotations. g												Shares sold.
					Apr. 14.		Apr. 16.		Apr. 17.		Apr. 18.		Apr. 19.		Apr. 20.		Clg
					H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st	H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st.	Bid
‡Consolidation Coal Co	$10,250,000	102,500	Jan. 1, '77, 2½.	$256,250	....	....	....	15	....	23	25	25*	....	20	....	....	*20	100
‡Delaware and Hudson Canal Co	20,000,000	200,000	Aug. 1, '76, 4....	800,000	44	41¾	42⅜	41	41⅞	40½	40½	38½	40½	38¾	40¾	38⅛	39	50,000
‡Delaware, Lackawanna and W. RR. Co	26,200,000	524,000 c	April 20, '76, 2½.	655,000	55⅛	52¾	52¼	50⅞	52¼	50¼	51	47⅞	49	45	45¾	42¾	44¼	21,543
§Lehigh Coal and Navigation Co	10,448,550	208,971 c	Sep. 3, '76, 1½.	156,728	41¾	40½	41	40¼	40¾	40¼	40½	39	39½	38	....	....	37¼	11,742
§Lehigh Valley Coal Co	27,042,900	540,858 c	April 15, '77, 1½	405,643	76	75½	76¼	75½	76	75	76	74	74	69½	....	....	68⅜	3,650
‡Maryland Coal Co	4,600,000	44,000	Jan. 31, '76, 1½.	66,000	....	8	....	7	....	7	....	8	....	8½	....	....	9	400
‡New Jersey Central RR. Co	20,600,000	206,000	April 20, '76, 2½	515,000	7¾	7⅝	7⅞	7⅝	7⅞	7½	....	7½	....	7½	....	7⅞	7¾	2,835
‡Pennsylvania Coal Co	5,000,000	100,000 c	Feb. 1, '77, 5....	250,000	....	*198	....	*194	....	*195	....	....	....	*200	....	....	....	....
§Pennsylvania RR. Co	68,868,700	1,377,376 c	Feb. 26, '77, 2..	1,377 374	75¾	74	75½	73¾	75	74½	74½	73¾	73¾	71¾	....	....	70	109,282
§Philadelphia and Reading RR. Co	34,278,755	685,575 c	Jan. 18, '76, 2½.	†856,969	24	23¾	24	23¾	24	23¾	23½	22½	23	22¾	....	....	21½	9,983

Total sales of coal stocks for the week . 407,432

MINING STOCKS, New York.

Name of Company.	Location.	Feet on Vein.	Capital Stock	a No. of Shares.	Total Assessments Levied.	Date and Amount of Last Assessment per Share.	Total Dividends paid.	Date and Amount of Last Dividend per Share.	These quotations are in currency, and are so much per share.						
									Sat.	Mon.	Tues.	Wed.	Thurs.	Fri.	
Alpha Cons. G. S.	Nev.	300	$ 3,000,000	30,000	$ 180,000	Aug. 12, '75, $1.	....	.....	$ 9 37½	$ 9 00	....	....	$13 75	$11 25	900
Am. Flag, G	Colo.	5,300	600,000	60,000	**	.....	.....	.....	....	....	....	$ 09	08	....	6,900
Belcher. G. S.	Nev.	1,040	10,400,007	104,000	864,400	Feb. 24, '77, $1.	$ 15,397,200	April 10, '76, $1.	5 50	....	....	....	7 75	5 75	700
Bertha, G	Virg.	645 acs.	300,000	30,000	**	.....	.....	.....	7 37½	7 62½	7 62½	7 62½	7 25	7 37½	4,300
Best and Belcher, G. S.	Nev.	545	10,080,000	100,800	236,992	Feb. 6, '77, $1.	....	.....	2 87½	17 75	22 25	22 75	25 25	22 00	1,900
Bobtail, G	Colo.	2,500	1,136,630	227,326	**	.....	....	.....	1 50	1 50	1 50	1 55	1 45	....	2,200
Bobtail Tunnel Co., G	Colo.	..	100,000	20,000j	6,000	July 7, '73, 30c.	20,000	Dec. 15, '76,	....	....	....	....	3 50	....	....
Bullion, G. S.	Nev.	943½	10,000,000	100,000	2,402,000	April 6, '77, $2.00	....	.....	....	7 00	7 00	9 37½	9 25	8 00	1,900
Caledonia, G. S.	Nev.	2,188	10,000,000	100,000	1,310,000	Feb. 10, '77, $1.	....	.....	2 50	....	....	3 87½	4 25	....	800
California, G. S.	Nev.	600	54,000,000	540,000	....	.....	12,960,000	April 15, '77, $2.	43 00	40 00	....	40 50	42 87½	40 00	1,100
Centennial, G	Cal'f	66 acres	1,000,000	100,000b	....	.....	....	.....	....	....	....	....	....	....	....
Chollar Potosi, G. S.	Nev.	1,400	2,800,000	28,000	1,282,000	June 26, '76, $5.	3,080,000	Feb. 10, '72. $1.	38 00	34 00	....	41 75	....	38 00	750
Cleveland, G	Colo.	3,715	250,000	25,000b	**	.....	....	.....	6 62½	6 75	6 75	6 87½	6 87½	7 00	5,200
Cons. Hercules & Roe	Colo.	16 500	1,000,000	100,000	**	.....	120,000	.....	....	....	....	....	....	....	....
Cons. Imperial. G. S.	Nev.	468	50,000,000	500,000	375,000	March 10, '77, 25c.	....	.....	1 12½	....	....	....	1 50	1 25	1,700
Con. N. Slope & E.C.T.	Colo.	15,000	500,000	10,000	**	.....	....	.....	....	....	....	....	....	....	....
Cons. Virginia, G. S.	Nev.	710	54,000,000	540,000	411,200	June 11, '73, $3.	25,920,000	Dec. 11, '76, $2.	37 00	35 00	34 62½	37 75	....	37 12½	1,050
Confidence, G. S.	Nev.	130	2,496,000	24,960	243,840	March 18, '73, $1.	78,000	May 1, '65, $8.33⅓	....	4 37½	4 37½	5 50	6 50	....	1,700
Crown Point, G. S.	Nev.	600	10,000,000	100,000	1,273,370	Jan. 10, '77, $1.	11,588,000	Jan. 12, '75, $2.	6 12½	5 00	5 50	9 00	9 50	....	2,100
Douglas Mining Co	Colo.	21,000	1,000,000	10,000	**	.....	....	.....	....	....	....	....	....	....	....
Eureka Cons. G. S. L.	Nev.	..	5,000,000	50,000	100,000	May 26, '76, $1.	1,000.000	Aug. 5, '75. $1.	20 12½	19 62½	19 75	....	20 00	21 00	1,100
Eureka G. Mg. Co	Cal'f					.....	....	.....	....	....	....	....	....	....	....
Exchequer, G. S.	Nev.	400	10,000,000	100,000	280,000	Sept. 23, '76, $1.	....	.....	3 37½	....	3 50	4 12½	....	4 00	1,200
Gould and Curry, G. S.	Nev.	621	10,800,000	108,000	2,242,000	April 5, '77, $1.	3,934,800	Oct. 10, '70, $10.	9 00	....	....	....	10 00	....	600
Grant, G. S.	Nev.	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	....
Granville Gold Co	N. C.	9,000	1,000,000	100,000	**	.....	....	.....	2 12½	2 00	2 12½	2 12½	2 25	2 37½	3,600
Hale & Norcross, G. S.	Nev.	400	11,200,000	112,000	2,410,000	April 5, '77, 50c.	1,598,000	April 10, '71, $1.	2 50	....	2 62½	....	....	3 75	1,100
Henry Tunnel Co	Nev.	3,000	2,000,000	80,000	**	.....	....	.....	6 37½	6 75	....	6 75	7 00	7 00	5,200
Hukill, G. S.	Colo.	3,288	1,000,000	100,000b	**	.....	30,000	April 10, '77, 10c.	4 00	4 12½	3 87½	3 87½	4 00	4 00	7,000
Indian Queen, S.	Nev.	1,000	3,000,000	60,000c	....	.....	60,000	.....	....	....	....	....	....	....	....
Julia Cons., G. S.	Nev.	3,000	11,000,000	110,000	330,000	April 5, '77, $1.	....	.....	....	....	....	....	....	2 00	200
Justice, G. S.	Nev.	2,100	10,500,000	105,000	1,502,500	Sept. 14, '76, $5.	....	.....	....	8 62½	....	....	11 25	10 50	600
Kentuck, G. S.	Nev.	95	3,000,000	30,000	270,000	Dec. 3, '74, $1.	1,252,000	March 8, '70, $5.	....	....	....	5 50	....	....	100
Kossuth, G. S.	Nev.	2,700	5,400,000	108,000c	405,000	Aug. 15, '76, 50c.	....	.....	....	....	....	....	....	....	....
Lacross G. M. Co	Colo.	3,900	1,000,000	100,000	**	.....	....	.....	....	....	....	....	....	....	10,300
Leopard, G. S.	Nev.	1,500	5,000,000	50,000	50,000	March 31, '76, $1.	162,500	Dec. 15, '76, 50c.	37	34	35	....	37	....	400
Lucerne Mining Co	Colo.	4,200	5,000,000	500,000b	**	.....	....	.....	....	....	3 12½	3 37½	....	....	400
‡Mariposa, pre	Cal.	44,387	5,000,000	50,000	1,350.000	Feb. 17, '77, $1.	1 25	1 12½	1 25	1 25	1 25	1 25	1 25	1 25	3,100
" " " " com	"	acres.	10,000,000	100,000	1,350,000	Feb. 17, '77, $1.	....	.....	....	....	4 25	3 00	3 12½	3 00	100
Mer. & Min. Tun. Co.	Colo.	30,000	500,000	50,000	**	.....	....	.....	....	....	....	3 00	3 12½	3 00	700
Merrimac, S	Mass.	1,500	500,000	50,000b	**	.....	55,000	April 10, '77, 10c.	7 00	6 75	7 00	6 75	6 87½	7 00	8,900
Mexican, G. S.	Nev.	600	10,080,000	100,800	100,800	Sept. 5, '76, 50c.	....	.....	....	8 75	9 25	....	....	....	200
Morning Star	Nev.	1,600	8,000,000	80,000	....	.....	....	.....	....	....	....	....	....	....	....
N. Y. & Colo., G	Colo.		1,000,000	50 000	**	.....	20.000	March 1, 17, 20c.	....	....	....	....	1 25	....	....
Northern Belle, S	Nev.	1,600	5,000,000	50,000	....	.....	1,100,000	March 15, '77, $1.	....	23 12½	18 25	18 00	....	....	800
Ophir, G. S.	Nev.	675	10,080,000	100,800	2,034,400	May 14, '75, $2.	1,394,400	March 9, '64, $4.	....	15 00	....	18 00	18 00	16 00	2,000
Original Comstock, G. S	Nev.	...	10,000,000	10,000	....	.....	....	.....	....	....	....	....	....	....	....
Overman, G. S.	Nev.	1,200	3,840,000	38,400	2,222,280	Oct. 21, '75, $3.	....	.....	20 00	16 50	19 25	23 50	29 50	23 12½	1,100
Pleasant View, G	Colo	1,200	200,000	20,000b	**	.....	....	.....	....	....	....	....	....	....	....
‡Quicksil. M. Co., pre.	Cal.	8,500	4,291,300	100,000	**	.....	....	.....	....	....	....	20 00	....	18 50	500
" " " " com	"	acres.	5,708,700	"	....	.....	....	.....	....	....	....	12 75	13 00	13 00	450
Raymond and Ely, G. S.	Nev.	5,000	3,000,000	30,000	540,000	Dec. 5, '76, $1.	3,075,000	Sept. 10, '73, $3.	4 50	....	4 12½	....	....	3 50	400
St. Joseph, L	Mo.	2600 acs.	1,000,000	100,000	....	.....	250,000	.....	....	....	....	....	....	....	....
Santiago, G. S.	Nev.	2,000	11,200,000	112,000	....	.....	....	.....	....	....	....	....	....	....	....
Savage, G. S.	Nev.	800	11,200,000	112,000	3,082,500	Mch. 29, '77, $1.	4,460,000	June 11, '69, $3.	....	2 87½	....	4 00	4 00	....	900
Seaton, G. S.	Colo.	1,700	500,000	50,000	**	.....	5,000	April 10, '77, 10c.	3 25	3 00	3 25	3 25	3 62½	3 62½	6,000
Seg. Belcher. G. S	Nev.	160	640,000	6,400	244,800	April 11, '76, $5.	....	.....	....	....	....	....	....	....	....
Sierra Nevada G. S.	Nev.	3,650	10,000,000	100,000	1,600,000	Feb. 15, '77, $1.	102,500	Jan. 16. '71, $1.	....	....	....	....	....	....	....
Silver City, G	Nev.	3,900	6,310,000	63,100	15,775	Nov. 16, '76, 25c.	....	.....	....	....	....	....	....	....	....
Silver Hill, G. S.	Nev.	5,400	10,800,000	108,000	864,000	Feb. 6, '77, $1.	....	.....	....	....	....	....	....	....	....
South Comstock, G. S.	Nev.	1,500	10,000,000	100,000	54,000	Jan. 30, '77, 25c.	....	.....	....	....	....	....	....	....	....
South. California, G. S.	Nev.	1,500	5,000,000	50,000	....	.....	....	.....	....	....	....	....	....	....	....
Southern Star. G. S	Nev.	1,500	6,000,000	600,000	....	.....	....	.....	....	....	....	....	....	....	....
Trenton, G. S.	Nev.	..	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	....
Union Cons., G. S.	Nev.	850	10,000,000	100,000	260,000	March 3, '76, $1.	....	.....	....	....	....	....	....	....	....
West Belcher, G. S	Nev.	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	....
Yellow Jacket, G. S	Nev.	1,200	12,000,000	120,000	2,838,000	March 2, '77, $1.	2,184,000	Aug. 10, '71, $2.50.	....	....	....	....	....	....	....
Young America, S	Nev.	1,000	3,000,000	30,000	6,000	Oct. 23, '76, 20c.	....	.....	....	....	....	....	....	....	....
		Total Assessments levied to date, $32,528,357				Div'ds pd. to date. $89,786,400			Total sales of Mining Stocks for the week..... 107,750						

Boston.

									Apr. 13.	Apr. 14.	Apr. 16.	Apr. 17.	Apr. 18.	Apr. 19.	
Allouez, c	Mich.	..	$1,000,000	20,000c	$ 940,800	May 9, '76, $5.	....	.....	7 00	7 25	7 50	7 75	7 00	6 50	.....
Calumet Hecla, c	Mich.	2¾ mile	2,000,000	80,000f	11,200,000	.....	$ 11,450,000	Feb. 15, '77, $5.	184 50	184 00	184 00	184 25	184 00	184 00	.....
Central, c	Mich.	..	500,000	20,000d	100,000	June, '62, 65c.	1,160,000	Feb. 6, '77, $7.	34 00	33 25	33 50	33 75	33 50	33 50	.....
Copper Falls, c	Mich.	..	1,000,000	20,000c	535,000	May 10, '76,	100,000	Nov., '71, $1.	2 75	2 87½	3 00	3 00	2 87½	3 25	.....
Dana, c	Mich.	..	500,000	20,000f	68,000	Jan., '73, 50c.	....	.....	6	5	5	6	6	6	.....
Dawson, S	Ont., C.	..	1,200,000	60,000f	....	.....	....	.....	14	13	13	12	12	12	.....
Duncan, S	Ont., C.	..	1,200,000	60,000f	75,000	July, '76, 41 2-3.	....	.....	5 25	5 12½	5 00	4 75	4 50	4 50	.....
Franklin, c	Mich.	..	500,000	20,000f	360,000	June, 68, $5.	585,000	Nov., '71, $1	11 50	11 25	11 25	11 25	11 00	11 00	.....
Humboldt, c	Mich.	..	500,000	20,000f	100,000	Sept. 28, '76, 15c.	....	.....	20	20	20	20	20	20	.....
International, S	Ont., C.	..	1,200,000	60,000f	....	.....	....	.....	50	50	50	50	43¾	37½	.....
Madison, c	Mich.	..	500,000	20,000f	123,000	Sept. 11, '74, 10c.	....	.....	23	22	21	20	20	20	.....
Mesnard, c	Mich.	..	500,000	20,000f	160,000	April 12, '65, 50c.	....	.....	35	35	33	30	30	30	.....
Minesota, c	Mich.	..	1,000,000	20,000c	436,000	June 10, '69, $1.	1,820,000	March 15, '76, 50c.	1 00	1 00	1 00	90	90	90	.....
National, c	Mich.	..	500,000	20,000f	195,000	Oct., '75, $1.	360,000	Oct., '73, $1.	85	85	80	80	85	87½	.....
Osceola, c	Mich.	..	1,000,000	40,000f	880,000	May 1, '76, $2.	....	.....	24 00	24 25	24 50	24 00	24 00	23 50	.....
Petherick, c	Mich.	..	500,000	20,000f	165,533	March 22, '76, 50c.	....	.....	22	22	20	20	20	20	.....
Pewabic, c	Mich.	..	500,000	20,000f	185,000	June, '68, $3.	460,000	July, '73, $1.	2 87½	2 87½	3 00	2 87½	3 00	3 00	.....
Phœnix, c	Mich.	..	1,000,000	20,000c	817,500	Sept., '70, $3.	20,000	Jan. 20, '76, $1.	....	....	....	....	....	....	.....
Quincy, c	Mich.	..	h 200,000	20,000b	....	.....	2,130,000	Feb. 15, '77, $4.	37 00	37 00	39 00	39 87½	39 50	39 50	.....
Ridge, c	Mich.	..	500,000	20,000f	200,000	.....	90,000	Feb. 8, '75, $1.	2 75	2 62½	2 87½	2 75	2 87½	2 87½	.....
Rockland, c	Mich.	..	500,000	20,000f	495,000	Jan., '74, $1.	....	.....	20	20	20	20	20	20	.....
Star, c	Mich.	..	500,000	20,000f	265,000	March 30, '76, 50c.	....	.....	20	20	20	20	20	20	.....
Superior, c	Mich.	..	500,000	20,000f	340,000	March, '74, 25c.	....	.....	10	10	10	10	10	10	.....
		Total Assessments levied to date.... $7,640,033				Div'ds paid to date, $18,175,000							Total sales..... —— shares		

g. Gold. s. Silver. L. Lead. c. Copper. *a* The par value of shares is $100, unless otherwise designated. *b* Par value $10. *c* Par value $50. *d* Par value $25 each. *e* Par value $15. *f* Par value, $20. *j* Par value, $5 00. Prices asked will have a * affixed. *g* For readiness of comparison the quotations of Philadelphia Stocks the shares being $50 each, are based upon a per centage value, or 100, equal to shares of $100. *h* Full paid. *i* On the four old companies. † This company declared a dividend of 3½ per cent. on its preferred stock in July, 1876. ‡ New York Stock Exchange quotations. § Philadelphia Stock Exchange quotations. ** Non-assessable.

declared payable on the 15th inst. At the present rate of production by this mine it would seem to be an easy matter to increase the dividends and still leave a handsome surplus.

The Ontario Silver Mine of Utah has declared its second monthly dividend of 50c. per share, aggregating $50,000.

The Modoc Consolidated Silver Mine, of Inyo County, Cal., is shipping bullion at the rate of about $70,000 per month.

Mariposa Land and Mining Company.—This Company has levied an assessment of $1 per share on the common and preferred stock, payable on the 30th inst. 800 shares of this stock have changed hands during the week, at from 3 to 4⅛ per share.

Taylor Gold Mine, El Dorado County, Cal.—Operations on the 500-foot level in this mine are being prosecuted with favorable prospects.

Rye Patch Silver Mine, Nev.—The shaft in this mine is down 200 feet below the adit level in soft ground. Ore is being extracted at the rate of twenty tons a day on an average. The mill is working about twelve tons a day, the pulp assay of which runs from $75 to $100 per ton.

Manhattan Silver Mine, Nev.—This mine produced 405 tons of ore during the month of March, the assay value of which was $87,360.

The Leeds Silver Mining Co., Nev., produced $33,000 on March account against $32,000 in February.

Raymond & Ely.—Some very rich ore was recently struck in this mine on the fifth level, the pulp assay going over $300. The mill of this Company is running steadily on tailings, ten stamps being employed on ore.

The Empire Gold Mine, of Gross Valley, Cal., produced $16,600 in bullion on March account.

The Tybo Consolidated Silver Mine shipped $106,000 in bullion on March account.

The Diamond and Mud Springs Gold Mines are located in El Dorado County, Cal. Considerable interest is being taken in the mines of this district, the ore being quite abundant, and yielding from $20 to $35 per ton.

The Richmond Silver Mine, of Eureka, Nev., has increased its working force, and is making arrangements for extensive operations.

NEW YORK MINING AND STOCK EXCHANGE.

We note a falling off in sales this week as compared with last of 2,100 shares. 10,300 shares of Lacrosse were sold at prices ranging from 32c. to 39c., closing at 37c., an advance of 5c. Quotations remain about the same.

Sales and closing quotations of copper stocks are as follows:

Atlantic	200 shares	@ 7.00
Franklin	100 "	@$12,00
National	100 "	@ 62½c.

CLOSING QUOTATIONS.

	Bid.	Asked.
Allouez Copper	6 25	9 00
Atlantic "	6 75	7 25
Calumet & Hecla	182 00	....
Central	34 00	40 00
Franklin	11 00	12 50
Madison	20	30
Mesnard	62½	1 00
Ninesota	....	....
National	50	75
Osceola	24 00	....
Pewabic	2 50	3 50
Quincy	39 50	....
Ridge	....	4 00
Rockland	....	....

Gas Stocks.

NEW YORK, FRIDAY EVENING, Apr. 20, 1877.

The market for gas stocks shows no animation, and prices but little change. We lower the quotations of the New York Mutual $4 per share; the Metropolitan, of Brooklyn $1, and advance the Nassau, of Brooklyn from $80 to $82½ per share.

The Suburban Gas Company.—The Gas Commission, consisting of the Mayor, Controller, and the Commissioner of Public Works, gave a hearing on the 16th inst., to Mr. John B. Haskin, who stated that, in his opinion, the contract made by the town officers of West Farms with the Suburban Gas Company to light lamps for 10 years, ending in 1881, at $50 each, per annum, was not binding on the City, because the officers had no right to make a contract beyond their own term of office, which was for one year. The matter was laid over.

The Kingston (N. Y.) Gas Difficulty.—From the *Freeman* of the 14th inst., we learn that the City has advertised for proposals for lighting its streets, the gas company failing to comply with the resolutions adopted by the Common Council increasing the number of hours for keeping the lamps burning and reducing the price paid by the city. The following statement in support of these resolutions was submitted at a meeting of the Council on the 13th inst.: The cost for 912 hours gas-light, including lighting and repairs, in Kingston is $27 50, as compared with

Newburg,	$13 72	Poughkeepsie,	$12 95
Schenectady	12 95	Hudson,	15 13
Albany,	8 85	Binghampton,	15 50
Troy,	9 75	Yonkers,	6 38

The Cumberland, (Md.,) Gas Difficulty.—The streets of this city are again illuminated, but not with gas. The gas company failing to comply with the proposition of the City, a contract for lighting the streets for one year has been awarded to the Philadelphia Globe Gas Company, burning Naptha at $18 per lamp, per year. This, it is stated, will effect a saving of about $1,700 from the expenditures for the previous year.

Northern Liberties Gas Company.—We note a recent auction sale in Philadelphia of a few shares of the stock of this company at $43 per share.

The Philadelphia Gas Trust Wages Reduction.—The trustees of the Gas Trust have ordered a reduction of 10 per cent. in the pay of employes, to go into effect on the 1st proximo. The pay of the stokers will be reduced from $2.68 to $2.40 per day, throwing off the extra $1 which it was usual to give during the hot summer months. The helpers will be reduced from $2.56 to $2.40, or the same as it is proposed to give the stokers, as their duties are nearly the same. In the purifying department the employes will be cut down twenty-five cents per day, and will also be deprived of the addition of $1 given in former years during the hot summer weather. The wages of the laborers will be reduced from $1.70 to $1.60 per day.

The ordinance introduced into the Common Council the 19th inst., to take possesion of the property in the custody of the Trustees of the Philadelphia Gas Works, and appropriating $500,000 therefor, for the payment of certain outstanding loans and the interest on loans created for the use of the works was postponed by a vote of 45 to 22.

Montreal Gas Company.—We note recent sales of about 300 shares of the stock of this company at from $147½ to $149 per share.

The Ottowa Gas Works of Canada have contracted for 3,000 tons of coal from the Sydney mines at $5.75 per ton. It is stated that this coal is equal to the English.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and vicinity.	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr c			
Mutual, N. Y.	$5,000,000	$100	2½	Apr. '77	94	95
" Gold Bonds	90,000	1,000	3½	Feb. '77		107
N. York "	4,000,000		5	Nov. '76	131	133
Metrop. "	2,500,000	100	5	Sep. '76	137	138
" " Certf.	1,000,000	....	3½	" "	103	105
" " Bonds	500,000	1,000	3½	Dec. "	102	—
Harlem "	1,850,000	50	4	Feb. '77	104	—
Manhat. "	4,000,000	50	10	Dec. '76	215	217
Brooklyn, B'klyn.	2,000,000	25	5	Nov. '76	170	174
Nassau, "	1,000,000	25	4	Jan. '76	82½	—
" " Certf.	700,000	1,000	3½	Nov. '76	95	—
People's, "	1,000,000	10	3½	Jan. '76	51	—
" " Certf.	300,000	1,000	3½	July '76	84	90
" " B'ds	325,000	....	3	Feb. '77	90	96
Metrop. "	1,000,000	10	3½	Nov. '76	77	80
Wmsb'rg "	1,000,000	50	3	Oct. '76	130	135
" " Certf.	1,000,000	....	3½	July "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	95	99
" " Certf.	320,000	1,000	3½	Oct. "	98	102
J. C., N. J.	750,000	20	5	July '75	160	—
Cent. Westch. N.Y	466,000	50	4	July "	85	90
Subur'n " "	295,000	50	3½	Oct 1 '76	90	100

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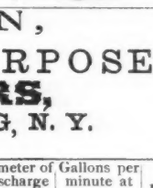

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1	3½	2	4	.055	½	¾	1¼	1	10	80.00
1½	4½	2½	5	.11	½	¾	1¼	1	20	125.00
2	5	3	7	.25	¾	1	1½	1¼	30	175.00
3	6	3½	7	.29	1	1¼	2	1½	40	215.00
3½	7	4	7	.38	1	1¼	2½	2	60	260.00
4	8	4½	10	.68	1¼	1½	3	2½	90	350.00
4½	8	5	10	.85	1¼	1½	3	2½	125	370.00
5	10	6	10	1.21	1¼	1½	3½	3	150	420.00
5½	10	7	10	1.66	1¼	1½	4	4	200	450.00
6	12	7	10	1.66	1½	2	4	4	200	500.00

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